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MILITARY HANDBOOK

AIRCRAFT MAINTENANCE FACILITIES

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ABSTRACT

This handbook is provided as guidance for aircraft maintenance facilities covered by Category Codes 211 and 212 for military real property. It is intended for use by experienced architects and engineers. The contents include design data for buildings and shop areas to provide aircraft maintenance, including airframes, aircraft engines, aircraft weapons systems, avionics systems, air-launched guided missiles, and other related aircraft equipment.

FOREWORD

This handbook has been developed from an evaluation of facilities in the shore establishment, from surveys of the availability of new materials and construction methods, and from selection of the best design practices of the Naval Facilities Engineering Command (NAVFACENGCOM), other Government agencies, and the private sector. This handbook was prepared using, to the maximum extent feasible, national professional society, association, and institute standards. Deviations from this criteria, in the planning, engineering, design, and construction of Naval shore facilities, cannot be made without prior approval of NAVFACENGCOM Criteria Office, Code 15C.

Design cannot remain static any more than the functions it serves or the technologies it uses. Accordingly, recommendations for improvement are encouraged and should be furnished to Commander, Naval Facilities Engineering Command, Code 15C, 1510 Gilbert Street, Norfolk, VA 23511-2699; telephone (757) 322-4204, facsimile (757) 322-4416.

THIS HANDBOOK SHALL NOT BE USED AS A REFERENCED DOCUMENT FOR PROCUREMENT OF FACILITIES CONSTRUCTION. IT IS TO BE USED IN THE PURCHASE OF FACILITIES ENGINEERING STUDIES AND DESIGN (FINAL PLANS, SPECIFICATIONS, AND COST ESTIMATES). DO NOT REFERENCE IT IN MILITARY OR FEDERAL SPECIFICATIONS OR OTHER PROCUREMENT DOCUMENTS.

MAINTENANCE FACILITIES CRITERIA MANUALS

Criteria Manual	Title	Preparing Activity
MIL-HDBK-1028/1	Aircraft Maintenance Facilities	NAVFAC
MIL-HDBK-1028/3	Maintenance Facilities for Ammunition, Explosives, and Toxins	NFESC
DM-28.4	General Maintenance Facilities	EFA CHES
MIL-HDBK-1028/5	Environmental Control - Design of Clean Rooms	NFESC
MIL-HDBK-1028/6	Aircraft Fixed Point Utility Systems	SOUTHDIV
MIL-HDBK-1028/8	Pest Control Facilities	NAVFAC

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Section 1: INTRODUCTION

1.1 Scope. This handbook contains criteria for the design of Navy and Marine Corps aircraft maintenance facilities, except most Naval Aviation Depots (NADEPs), to support the Naval Aviation Maintenance Program in accordance with Chief of Naval Operations (OPNAV), OPNAVINST 4790.2, The Naval Aviation Maintenance Program (NAMP).

1.2 Cancellation. This handbook cancels and supersedes MIL-HDBK-1028/1A of 31 October 1991.

1.3 Other Design Considerations. Aircraft maintenance officers of shore activities are to be closely consulted throughout the entire design effort of any project related to the construction, repair, or modernization of aircraft organizational and intermediate facilities (refer to Volume 1 of OPNAVINST 4790.2). This is to ensure that technical requirements for specific aircraft maintenance and testing procedures as outlined in Naval Air (NAVAIR) technical manuals receive proper consideration in the design of these facilities.

1.4 Facility Plates. When definitive drawings are revised, they are converted to facility plates to be included in the handbook covering that type of facility. The facility plate number is the category code number, and the sheets required to present the information are numbered sequentially.

1.5 Definitive Drawings. Definitive drawings, where they exist for aircraft maintenance facilities covered by this handbook, are contained in NAVFAC P-272, Part 3, Definitive Designs for Marine Corps Facilities, and are an integral part of the Naval Facilities Engineering Command (NAVFACENGCOM) design program. Definitive drawings are listed in numerical sequence by the Navy category code number assigned to that facility. Definitive drawings associated with this handbook shall be used as the basis for design, unless prior clearance for change is obtained from NAVFACENGCOM. The architectural treatment, materials, framing, and construction may vary. Special design features for a particular aircraft system will be provided by the system facilities requirement document of the NAVAIR Facilities Branch.

1.6 Planning Criteria. Naval aviation is a highly dynamic field and maintenance concepts depend increasingly on state-of-the-art computer technology. Planning factors in NAVFAC P-80, Facility Planning Criteria for Navy and Marine Corps Shore Installations, and design criteria included in the NAVFAC criteria manuals are guides that must be used with specific weapons system facilities requirement documents (FRD) to design a fully usable aviation facility. NAVAIR Facilities Management Division, Fleet Support Branch, works with the weapons systems developers to identify unique aviation facility

requirements. NAVAIR engineering personnel are available during design and construction to provide specialized expertise to NAVFAC or to arrange for weapons system manufacturers' representatives to attend design reviews if requested by NAVFAC Engineering Field Divisions (EFDs) or Engineering Field Activities (EFAs) or aviation facility users.

1.7 Building Functions. Naval and Marine Corps shore aircraft maintenance complexes consist of buildings and mobile facilities (MFs). In these complexes are facilities and shops for the repair and maintenance of aircraft and component parts. The Aircraft Intermediate Maintenance Department (AIMD) officer complex normally includes the following shops (buildings):

a) AIMD Administration,

b) Airframes Shop,

c) Engine Maintenance,

d) Avionics Shop,

e) Aviation Armament Shop (see facility plates),

f) Aviation Life Support Systems,

g) Engine Test Cells,

h) Battery Shops, and

i) Ground Support Equipment Shop.

While the construction of MFs is not covered in this handbook, their interrelated use and connection to the buildings shall be a considered part of each design.

1.8 Organizational Communications. An intercommunicating two-way voice system, with use restricted to maintenance and material management (3M), shall be provided. The system will connect the AIMD officer, assistant officer, and production control office with each squadron maintenance control office in the aircraft maintenance hangar and the production control offices in the:

a) Airframes Shop,

b) Avionics Shop,

c) Engine Maintenance Shop,

d) Ground Support Equipment (GSE) Shop,

e) Aviation Armaments Shop, and

f) Aviation Life Support Systems Shop.

NOTE: The AIMD will be located in the station administration building, a separate maintenance administration building, or one of the shop buildings (preferably the Avionics Shop). For maintenance hangars' organizational communications, refer to par. 2.6.

1.9 Energy Conservation. Energy conservation shall be a major consideration in the design of building envelopes, mechanical systems, and electrical systems for aircraft maintenance facilities. Refer to MIL-HDBK-1003/3, Heating, Ventilating, Air Conditioning, and Dehumidifying Systems. Each building envelope shall be insulated to provide the minimum heat transmission ("U") factors practical to meet energy budgets.

1.10 Environmental Concerns. The maintenance facilities shall meet applicable pollution abatement criteria. For applicable discharge criteria, NAVFACENGCOM Code 15C and the cognizant EFD or EFA should be consulted. Refer to MIL-HDBK-1005/8, Domestic Wastewater Control, MIL-HDBK-1005/9, Industrial and Oily Wastewater Control, and NAVFAC DM-1.03, Architectural Acoustics.

It is essential that, as part of the preliminary studies, consideration be given to water conservation and source control, including the possibility of substantial alteration of the process or plant operation to reduce pollutant loading. The greater the volume of wastewater to be treated and the greater the amount of contaminant to be removed or destroyed, the higher are the capital, labor, and material costs required. As a result, it is often economical to eliminate or reduce the quantity of waste at its source prior to treatment or in place of treatment. Several possible techniques exist including process change, material recovery, segregation, and water reuse. Sometimes, with only partial purification, spent water can be reused, once or several times, in the industrial process. Water unsuitable for direct reuse may be serviceable for a different purpose, in which quality requirements are less restrictive.

Often, there are a number of alternatives that can achieve the desired result. Therefore, a major objective of the preliminary studies should be to determine what combinations of actions will be the most cost effective and technically and operationally feasible.

1.11 Building Protection. The building structure of all aircraft maintenance facilities, including corners of interior partitions and exterior walls, doors, structural members, etc., shall be protected

from damage by vehicles and moving loads by the installation of concrete-filled pipe guards, bumpers, railings, corner guards, and similar protective features.

1.12 Loading Dock Ramp Protection. Each facility requiring a loading dock ramp shall be provided side-edge protection in accordance with Section 1910.23c of Public Law 29, Code of Federal Regulations, Section 1910, Occupational Safety and Health Act Standards Manual.

1.13 Fire Protection. Fire protection for aircraft maintenance facilities shall be provided in accordance with MIL-HDBK-1008B, Fire Protection for Facilities Engineering, Design, and Construction; National Fire Protection Association (NFPA) 409, Aircraft Hangars; and Air Force Regulation (AFR)-88-15, Criteria and Standards for Air Force Construction, as applicable to the specific building.

1.14 Restrictions on the Use of Uncoated Aluminum

1.14.1 Seacoast. Aluminum roofing and siding shall not be specified for structures located within 10 miles (3.05 kilometers (km)) of the seacoast, due to salt deposition or incrustation from inshore winds and salt-laden atmosphere.

1.14.2 Exterior and Interior. The restrictions for the use of preformed (corrugated) aluminum roofing and siding are applicable also to sandwich panel and flat sheet construction of unprotected (uncoated) aluminum and to ribbed aluminum extrusions. Consideration should also be given to the corrosion of aluminum surfaces on the interior of structures due to salt deposits from salt-laden air.

1.14.3 Incompatible Materials. Surfaces of incompatible metals; wet, green, or damp wood; wood treated with incompatible preservatives; masonry; and concrete shall be isolated from direct contact with the aluminum by a heavy coat of alkali-resistant paint or by other approved means.

1.14.4 Coated Metal. Coated metal roofing and siding shall be in accordance with Naval Facilities Guide Specification (NFGS)-07410, Metal Roof and Wall Panels.

Section 2: MAINTENANCE HANGAR

2.1 Function. Design the maintenance hangar to provide weather-protected shelter for the servicing and repair of Navy and Marine Corps aircraft, emergency shelter for operable aircraft, and headquarters and office space for squadron personnel. This type of hangar shall consist of hangar (OH) space, shop and equipment (01 level) spaces, and administrative (02 level) spaces required to support the aircraft and the mission of the particular squadron or activity occupying the hangar at any particular time. The optimum maintenance hangar design usage shall be the support function of one or two complete squadrons dependent upon the type of aircraft involved. Squadrons housed in maintenance hangars may be either permanent or mobile, as defined in NAVFAC P-80.

2.2 Location. The siting of maintenance hangars shall be correlated to minimize distance between the hangar and parked aircraft while maximizing the efficiency of operations and visual and verbal communications. Factors that must be emphasized include building orientation to apron and taxiways, modular expansion, line shack locations, intermediate maintenance shop relationship, ground support equipment (yellow gear) location and storage, and unique climatic conditions.

2.3 Architectural and Structural Requirements. The maintenance hangar shall be a modular building designed to allow flexibility and economical expansion by internal rearrangement and/or additional modules. Modules shall be designed to meet necessary flexibility and maintenance requirements in organization, strength, quantity, type of aircraft, and level of maintenance. There are two types of modular maintenance hangars, as indicated by the facility plates. A Type I maintenance hangar is principally designed for carrier aircraft, but it is adaptable to meet flexibility requirements for rotary-wing aircraft and various types of smaller general purpose and special mission aircraft. The 01 level and 02 level spaces in this type of hangar are configured for a typical attack squadron, two carrier air early warning squadrons, and a headquarters and maintenance services squadron. A Type II maintenance hangar is principally designed for patrol aircraft, but it is adaptable for larger general purpose or special mission aircraft. The 01 level and 02 level spaces are designed to accommodate a typical heavy antisubmarine warfare patrol squadron. Adequate and secure storage space shall be provided throughout the maintenance hangar as required by the offices and shops occupying the facility. For larger special mission aircraft, design hangars for specific requirements.

2.3.1 Structure. The modular structure of the maintenance hangar shall be a steel frame with a rigid cantilever web truss roof. Use of a columnless cantilever roof structure over the hangar bays allows for maximum maneuverability of aircraft within the hangar as well as

flexibility for future change in base loading. Hangar expansion can be accommodated by construction of additional hangar modules attached to existing hangars without the need for columns at the front or ends of the hangar bay areas. Use of alternative roof structures requires prior approval from NAVFACENGCOM Code 15C. Design the hangar using prefabricated components to the maximum extent practicable. Weathering steel, if considered, shall not be used where exposed to recurrent wetting by salt water. In areas where weathering steel is acceptable, proper detailing and use of materials shall be a requirement to prevent staining of adjacent building components. Design the overall structural suspension system for wind uplift conditions peculiar to the site. Provide a bridge crane in the OH space of each maintenance hangar module supporting helicopters or AV-8, C-2, C-9, C-130, E-2, P-3, or V-22 aircraft. Do not use bridge cranes in maintenance hangars supporting other types of aircraft except in specialized instances approved by NAVFACENGCOM Code 15C or when specifically required by the FRD. Requirements for the bridge crane, motor, and controls are given in par. 2.8. Provide a storage mezzanine in the OH space of both Type I and Type II maintenance hangars and designed for a live load of 100 psf (488 kilograms/square meter). Storage areas must comply with NFPA 409 requirements for minimum 1-hour separation.

Wind load on main building wind-force resisting system shall be determined based on the following two conditions:

a) Hangar doors fully open for winds up to 60 mph.

b) Hangar doors closed for winds above 60 mph up to the maximum wind velocity for geographic area. (Refer to MIL-HDBK-1002/2, Loads.)

2.3.2 Roof Systems. The roof system, due to large surface area and proximity to operating aircraft, shall be carefully selected. Expansion joints, insulation vents, and traffic pads or walkways shall be provided where applicable. Insulation shall be provided as required in par. 1.9. On built-up roofs, the design shall preclude carrying gravel or slag aggregate from the roof surface by high winds or drainage to any area in which aircraft operate. The color of roof surfaces shall be as described in par. 2.3.8. Provide gutter and outrigger downspouts at the front of the hangar. Provide snow guards at the front of the hangar in areas subject to heavy snowfall. Provide interior access from 02 level spaces to the low roof and exterior access to the high roof through a secured access panel or hatch, to prohibit unauthorized passage. Select the most suitable roof systems from the following criteria:

a) Very low slope (minimum of 1/2 in. per ft (6 mm per 305 mm)). Where roof slopes are 1/2 in. per ft, decks shall be stiff enough to prevent ponding, and a built-up roof should be smooth

surfaced. Built-up roofing, insulation, and moisture protection shall conform to the applicable guide specifications listed in MIL-HDBK-1000/1, Engineering and Design Criteria and Documentation for Navy Facilities. Use one of the following systems:

(1) Metal roof decking with insulated, built-up roof.

(2) Poured-in-place gypsum slab on formboard with insulated built-up roof.

(3) Pre-engineered insulated metal roof panels (only on roof with slope of 1 in. per ft (25.4 mm per 305 mm) or greater).

b) Pitched roofs. Insulated metal roof panels shall be used. Panels shall be pre-engineered or field-fabricated and filled with blanket or rigid insulation (with insulation blocks over purlins).

c) Other types of roofs based on cost and energy savings can be considered.

2.3.3 Wall Systems. Walls and partitions shall be nonload bearing.

2.3.3.1 Exterior Walls. Sidewalls of the OH space shall be insulated concrete masonry units (minimum 50 percent solid with joint reinforcing) or other cementitious materials, to a height of 10 ft (3.05 m) above the hangar deck. Above this height, use preformed (corrugated), protected-metal panels, backed with rigid or blanket insulation, except that translucent reinforced fiberglass panels should be used to increase natural lighting. Insulated panels shall be capable of withstanding water effects of deluge discharge. The installation of translucent wall panels is contingent upon an energy analysis for areas having 3000 heating degree-days or better. It must be shown that the quantity of lighting-related energy saved exceeds the quantity of heating-related energy lost through the uninsulated, translucent panels. Factors that should be considered other than degree-days are light transmission and the coefficient of heat transmission (U factor). In areas of seismic activity, seismic codes shall govern for this wall construction. Aluminum panels may be used only in accordance with par. 1.14. Exterior walls of the 01/02 level spaces of the structure shall be concrete masonry units, including walls abutting OH space, with voids filled with insulation. Windows to the exterior of the 01/02 level spaces shall be operable thermopane units. Any framing and connecting paneling between windows shall be insulated storefront units.

2.3.3.2 Interior Partitions. The interior partitions shall be metal studs with vinyl-covered gypsum wallboard or hardboard facing over insulation (when essential to minimize noise transmission

between spaces). Surface materials of interior partitions shall meet the requirements in MIL-HDBK-1008B. All 01 and 02 level spaces, except soundproofed spaces, shall be designed to provide the preferred noise criteria (PNC) levels given in Table 3-9 of NAVFAC DM-1.03. Treat administrative spaces requiring soundproofing with above-ceiling barriers and design spaces to provide a PNC of 25. Provide above-ceiling barriers for spaces that require locked doors. Windows from the 02 level space to the OH space shall be 1/4-in. (6 mm), fixed, tempered wire glass in steel frames and shall be provided with sound-attenuating drapes. Provide tempered wire glass windows, to the extent allowed by the various codes, in swinging fire doors between shops, control rooms, and the OH area. In all 01 and 02 level administrative and shop spaces, provide a system for hanging charts and schedules on available wall surfaces. Corners of partitions in the 01 level space shall be protected with corner guards.

2.3.4 Floors. Maintenance hangar floors shall meet the following criteria:

a) Design the primary loading areas of the hangar floors in accordance with criteria in MIL-HDBK-1021/2, General Concepts for Airfield Pavement Design, and MIL-HDBK-1021/4, Rigid Pavement Design for Airfields.

b) Hangar floors shall be sloped towards hangar doors and drains.

c) Use of reflective floor coatings to floor slabs is prohibited due to maintenance problems. Include a white dry shake floor hardener as the topping on the concrete floor slab to help achieve increased lighting levels without increased energy consumption. Surface hardener shall consist of specially selected cement plasticizer, and water-reducing admixtures formulated and processed under stringent quality control of the manufacturer. For questions on dry shake floor applications, contact LANTDIV Code 4062.

d) Floors of personnel and administrative spaces shall be designed for a uniform live load of 100 psf (488 kilograms/square meter) and provided with floor coverings as designated in MIL-HDBK-1001/2, Materials and Building Components. A subfloor electrical distribution system through metal ducts and built-in junction boxes through the concrete top layer shall be provided on a modular basis.

e) To provide access in event of a fire, injury, or other problem, a 10 ft emergency access lane from side to side at the rear of each bay and from the rear to front in each bay is required. Paint fire lanes on the floor after reflective floor coating cures.

2.3.5 Ceilings. Administrative and personnel spaces shall be provided with a noncombustible, suspended acoustical ceiling. Toilet, locker, and cleaning gear room ceilings shall be water resistant.

2.3.6 Doors and Door Controls. Doors and door controls shall meet the criteria defined in pars. 2.3.6.1 through 2.3.6.5.

2.3.6.1 Hangar Doors. Hangar doors shall be a series of insulated, horizontal sliding leaves with protected, preformed (corrugated) metal or sheet-steel siding. Each sliding door leaf shall be supported on hardened wheels rolling on recessed rails with guide rails at the top of the door. Thresholds shall be designed to minimize dirt accumulation or ice buildup at rails. Leaves of the door shall be insulated and shall be provided with waterproof weatherstripping and emergency personnel exits as required by NFPA 101, Code for Safety to Life From Fire in Buildings and Structures. The hangar doors shall be hand-crank operated or electric motor operated. For electric motor operation, drives may operate leaves independently or in groups of three with drives on the end leaves and a pickup mechanism for the center leaf. The use of a cable system for the pickup mechanism should not be considered due to the extra maintenance required to keep the cable system in good operating condition. Each drive unit shall have a release mechanism, and the doors shall be provided with a means of movement in the event of power failure. The minimum speed of door travel shall be 60 fpm (0.3 m/s).

Control of the doors shall be by momentary contact type pushbuttons located near the leading edge of the door and limit switches on each door leaf. Safety devices shall be installed to prevent injury to personnel and damage to equipment by moving door sections. An alarm shall sound in conjunction with safety warning beacons when doors are in motion. Sliding steel hangar doors shall be in accordance with NFGS-08372, Steel Sliding Hangar Doors.

2.3.6.2 Personnel Doors. Personnel doors between the hangar (OH) and shop spaces (01 level) shall be 3/4-hour, C-rated, self-closing, insulated fire doors. Hold-open devices shall not be permitted.

2.3.6.3 Interior Personnel Doors. Interior personnel doors to stairways shall be self-closing, swinging doors. Hold-open devices shall not be permitted. Refer to the appropriate guide specifications listed in MIL-HDBK-1000/1.

2.3.6.4 Overhead Doors. Overhead doors between the hangar (OH) and shop spaces (01 level) shall be 3/4-hour, C-rated.

2.3.6.5 Other Doors. For other doors, provide stock industrial doors in accordance with the appropriate guide specifications listed in MIL-HDBK-1000/1. Provide one self-closing, insulated personnel

exit door through the middle leaf of hangar door group and in each side wall of the hangar (OH space). No hold-open device shall be permitted. A vehicle access door must be provided either within or adjacent to the hangar aircraft access doors.

In the 01/02 level spaces, use heavy-duty commercial grade door and window hardware (Grade 1). Use 1000 series, Grade 1, door and window hardware where extremely heavy traffic is anticipated. Use security Grade 2 locksets.

2.3.7 Soundproofing. The spaces requiring soundproofing, as shown in the facility plates, shall be soundproofed to reduce the noise level from the outside to a PNC of 25. Refer to NAVFAC DM-3.10, Noise and Vibration Control of Mechanical Equipment. Spaces shown in the facilities requirements document as containing equipment generating high noise levels shall be soundproofed to limit noise levels in adjacent spaces to acceptable levels.

2.3.8 Surface Treatment. The chemical properties of materials and finishes for exterior surfaces shall have the highest resistance to the effects of weather and salt-corrosive atmosphere.

To prevent mirrorlike reflections from building surfaces to aircraft in flight, roofs and other external surfaces shall have a specular reflectance compatible with the location of the building on the airfield. If the building is so located that glare may be an operational hazard, the critical surfaces of that building shall have a light reflectance of not more than 10, measured at an angle of 85 degrees in accordance with American Society for Testing and Materials (ASTM) D523, Specular Gloss.

2.3.9 Exterior Pavement. Exterior paved areas shall include aircraft and vehicle access and nonorganizational parking. Aircraft pavement shall be in accordance with MIL-HDBK-1021/2 and MIL-HDBK-1021/4. Vehicle access and parking shall be in accordance with facility plates in this handbook; NAVFAC DM-5.04, Pavements; and MIL-HDBK-1190, Facility Planning and Design Guide.

2.4 Mechanical Requirements. The maintenance hangar shall be designed to meet the criteria set forth in pars. 2.4.1 through 2.4.6.

2.4.1 Heating. Heating shall be provided in accordance with MIL-HDBK-1003/3 and as follows:

a) Design for an infiltration rate of two air changes per hour in the OH area. This rate is dependent upon the installation of nylon brush insulation seals on the hangar sliding doors.

b) A switch activated by opening the hangar doors shall override the space thermostat to stop the heating equipment in the OH area. Provide a minimum temperature thermostat field set at 34

degrees F (1 degree C) to override the heating deactivation switch during door-open periods of subfreezing ambient temperatures. After the doors are closed, the room thermostat should assume control. Heating system recovery time shall be 30 minutes after the doors are closed.

c) A snow-melting system at the hangar door tracks shall be installed when outside design temperature is plus +25 degrees F (-4 degrees C) or lower and historical snow accumulation data supports the requirement.

d) An underfloor heating system shall be provided for the OH area when outside design temperature is below -10 degrees F (-23 degrees C).

e) The automatic thermostatic control shall meet the requirements of MIL-HDBK-1003/3.

f) Each bay in the OH area shall be a separate heating zone.

g) Refer to the facility plates for design conditions.

h) Consider the installation of Naval Facilities Engineering Service Center (NFESC) cold jet destratifiers based on an economic analysis.

2.4.2 Ventilation. Ventilation shall be provided in accordance with MIL-HDBK-1003/3 and as follows:

a) Toxic fumes and combustible vapor that generate in work areas shall be exhausted directly to the outside.

b) If fuel systems maintenance is performed, a system for purging the fuel line and the tanks shall be provided. A fuel vapor exhaust system shall also be provided.

2.4.3 Air Conditioning. Air conditioning shall be provided in accordance with MIL-HDBK-1003/3 and MIL-HDBK-1190. Automatic thermostatic control shall be provided, and equipment shall be shut down when not required for cooling.

2.4.4 Plumbing. Plumbing shall be provided in accordance with NAVFAC DM-3.01, Plumbing Systems, and shall provide:

a) An adequate storm drainage system,

b) Trench drains with sufficient laterals for aeration and easy cleanout of oil or other residue,

c) Emergency shower/eyewash fixtures and floor drains, as shown in the facility plates and conforming to American National Standards Institute (ANSI) Z358.1, Emergency Eyewash and Shower Equipment,

d) An oil/water separator for trench drains,

e) Storm drains located a minimum of 12 in. (305 mm) from the hangar access door rails, and

g) Aqueous film-forming foam (AFFF)/sprinkler discharge collection/retention system when required by environmental regulations.

2.4.5 Compressed Air. Compressed air shall be provided in accordance with NAVFAC DM-3.05, Compressed Air and Vacuum Systems. Compressed air shall be provided for airframe shops at 40 cfm (0.018 cubic meters/second) and 125 psi (862 kPa) and for hangar (OH) space, as required by MIL-HDBK-1028/6, Aircraft Fixed Point Utility Systems, for hangar service points.

2.4.6 Noise and Vibration Control. Mechanical systems and equipment shall be designed to limit noise and vibration in accordance with NAVFAC DM-3.10.

2.5 Electrical Requirements. Electrical systems shall be provided in accordance with the electrical engineering criteria manuals and pars. 2.5.1 through 2.5.4 of this handbook.

2.5.1 Hangar (OH) Space. The maintenance hangar (OH) space shall be designed to meet the criteria set forth in pars. 2.5.1.1 through 2.5.1.2.

Electrical equipment in the hangar (OH) space shall be waterproof when deluge sprinkler protection is provided to prevent equipment damage in the event of testing or accidental discharge of the deluge system.

2.5.1.1 Hazardous Zones. Areas in high bay space shall be classified as hazardous or nonhazardous in accordance with the NFPA 70, National Electrical Code, and electrical installations shall meet applicable requirements. Where possible, electrical installations will not be located in hazardous zones.

2.5.1.2 Power Service Points. MIL-HDBK-1028/6 identifies the various types, the capacity, and the location and installation requirements of electrical power to be provided at the power service points.

2.5.2 01/02 Level Spaces. Power outlets shall be provided for shop tools and at shop bench locations. In the electronics shop, electrical power outlets shall be provided as follows:

a) Three-phase, 115/200 V, 400 Hz, 100 ampere capacity.

b) Three-phase, 60 Hz, 480 V, 100 ampere capacity.

c) 28 V direct current, 50 ampere capacity.

Grounded convenience outlets at 60 Hz, 120 V, 20 ampere capacity shall be provided throughout the 01/02 level administrative, personnel, and shop spaces as required by NFPA 70. Provide ground fault interrupt (GFI) receptacles in locations required by NFPA 70.

2.5.3 Lighting. Lighting for the maintenance hangar shall be designed to meet the criteria set forth in pars. 2.5.3.1 through 2.5.3.2.

2.5.3.1 Interior Lighting. Interior lighting in the hangar (OH) space shall be an energy-efficient type, such as high-pressure sodium vapor. Other interior lighting shall be fluorescent. Lighting intensities shall be designed in accordance with MIL-HDBK-1190 and shall take into consideration the reflectance of wall and floor surfaces, especially in hangar (OH) spaces.

2.5.3.2 Exterior Lighting. Exterior lighting shall use high-pressure sodium lamps where practical and shall be in accordance with MIL-HDBK-1004/4, Electrical Utilization Systems.

2.5.4 Grounding. The maintenance hangar shall be provided with flush floor ground receptacles, each with a 3/4-in. (19 mm) diameter ground rod, on 24 ft (7.3 m) centers across the centerline of the OH space. Resistance to ground shall be 25 ohms maximum. Ground receptacles shall be provided together with No. 4 AWG bare copper in or below the hangar floor. See Figure 1 for typical static grounding details.

2.5.5 Lightning Protection. Lightning protection shall be provided in accordance with NAVSEA OP-5, Ammunition and Explosives Ashore.

2.6 Organizational Communications. The maintenance hangar shall be provided with internal communications as described in pars. 2.6.1 through 2.6.4 (refer to par. 1.8 for other organizational communications requirements).

2.6.1 3M Communications (Maintenance and Material Management). An intercommunications system, with use restricted to aircraft maintenance and material operations only, shall be provided. This system shall provide two-way communications from line operations

shacks outside the hangar to and between all rooms in the 01 level space except passages, locker and toilet rooms, and mechanical equipment room. The necessary raceway shall be provided in new building construction, with provisions in some instances for interconnection with other buildings.

2.6.2 Intercommunications System. An intercommunications system shall be provided to allow two-way communications between:

a) All rooms in the 02 level space except passages, locker and toilet rooms, and storage rooms,

b) Department heads and the commanding officer and executive officers of the squadron,

c) Officers' ready room and maintenance control, and the

d) Administration office and maintenance administration.

2.6.3 Public Address System. A public address system shall be provided to reach interior and exterior work areas and the aircraft parking apron.

2.6.4 Television Surveillance System. A closed-circuit television surveillance system shall be provided in support of maintenance control and security. Two cameras shall be mounted on opposite ends of the hangar at the rear wall line just below truss level and shall be positioned to cover the OH space. Cameras shall be mounted on the exterior of the hangar and positioned to cover assigned apron spaces. Television monitors shall be located in the maintenance control office and the duty office.

2.7 Security. The maintenance hangar shall contain secure storage vaults with walls of 8 in. (203 mm) masonry extending to the roof level. Vaults shall meet security requirements of the facility in accordance with Chapter V of OPNAVINST 5510.1, Department of the Navy Information and Personnel Security Program Regulation. In Marine Corps hangars, secure space shall be provided for organizational small arms. Refer to MIL-HDBK-1013/1, Design Guidelines for Physical Security of Facilities, for additional criteria.

2.8 Weight-Handling Equipment. When required in accordance with par. 2.3.1, the maintenance hangar (OH) space shall contain overhead bridge cranes and jib cranes in accordance with criteria in NAVFAC DM-38.01, Weight-Handling Equipment, and pars. 2.8.1 and 2.8.2.

2.8.1 Bridge Cranes. Overhead bridge cranes shall have an electric motorized bridge, trolley, and hoist. One 5-ton capacity crane shall be used per hangar module, with the bridge designed to travel the full width of the module. The bridge shall span 40 ft, with the center line of the bridge located 30 ft from the rear bulkhead. Trolley and bridge shall be capable of operating at a slow speed of 15 to 20 ft/min (0.076 to 0.102 m/s) for positioning loads and at a high speed for moving loads of 60 ft/min (0.305 m/s); the hoist shall be capable of operating at a slow speed of 3 to 4 ft/min (0.015 to 0.02 m/s) and at a high speed of 12 ft/min (0.06 m/s). Refer to NFGS-14637, Cranes, Overhead Electric, Underrunning (Under 50,000 Pounds).

2.8.1.1 Motor and Controls. Bridge, trolley, and hoist controls shall provide for two-speed reversing of a two-speed, squirrel-cage motor. The controls shall be equipped with reduced voltage starting for the motors. Controls shall be operable from the floor.

2.8.1.2 Hook Height. The hook height for bridge cranes shall be as required to raise engines and transmissions clear of aircraft.

2.8.2 Jib Cranes. Jib cranes shall be electrically operated with a capacity of 500 pounds (226.5 kg). Jib cranes shall be capable of transferring a palletized load from the hangar deck to the mezzanine level.

2.9 Utility Location. The following criteria shall be used to locate utilities inside the hangar (OH) space:

Locate utilities on the rear bulkhead only. Use of utility pits in hangar floors is specifically prohibited. Utility pits in hangar floors are unsatisfactory for the following reasons:

a) Litter can block the drains and water will "stand."

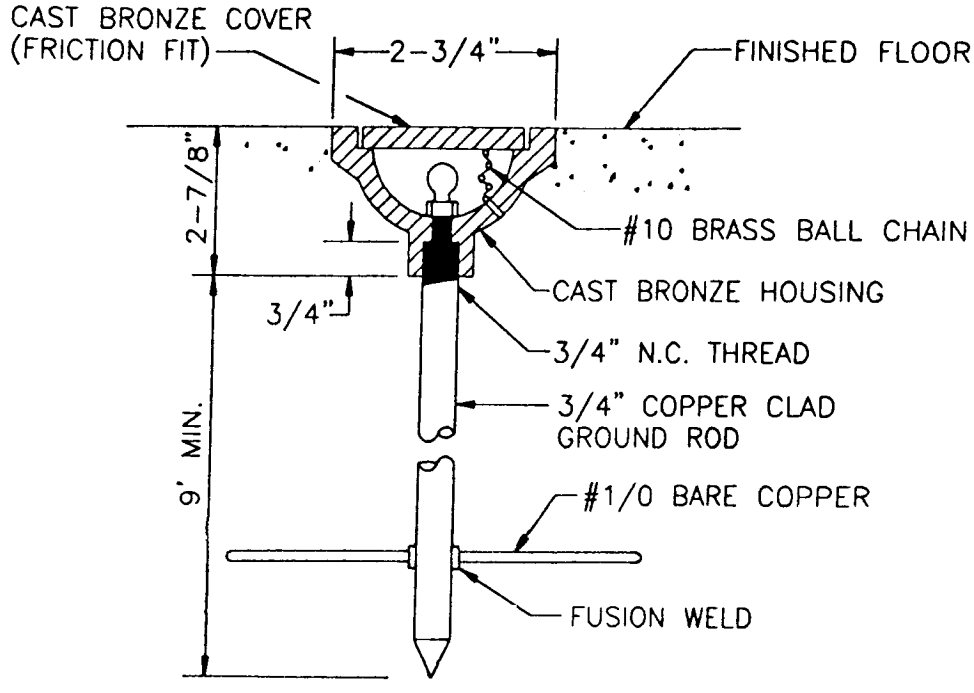
b) If an aircraft wheel sits on the pit cover, the utilities in that pit are inaccessible.

c) The basic purpose for the utility pits is not achieved: the utility lines will still be on the floor and can be tripped over, run over, etc.

d) The cost of locating utilities in pits is higher than locating utilities on the rear bulkhead.

2.10 Fire Protection. The fire protection design shall be in accordance with MIL-HDBK-1008B, and pars. 2.10.1 and 2.10.2.

2.10.1 Hangar (OH) Space. AFFF overhead and floor nozzles shall be installed in the hangar bays. The following features shall be provided:



STATIC GROUNDING DETAIL

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Figure 1
Static Grounding Detail

a) Protect the areas using AFFF deluge sprinkler systems or pre-action AFFF sprinkler systems using closed head foam water sprinkler head systems. Refer to MIL-HDBK-1008B. The discharge rate shall be a minimum of 0.16 gpm/square foot (0.010 L/s per 0.0929 square meter) of air foam solution.

b) Where pre-action AFFF sprinkler systems are used, water supply in addition to hose streams and monitor nozzles shall be sufficient to satisfy volume of water required by the number of sprinkler heads opened in accordance with one of the following:

(1) Within an 8000 square foot (743 square meter) area where roof or ceiling height is 25 ft (7.6 m) or less above the floor level.

(2) Within an 18,000 square foot (1672 square meter) area where roof or ceiling height is over 25 ft (7.6 m) but not more than 75 ft (22.8 m) above the floor level.

(3) Within a 35,000 square foot (3,252 square meter) area where roof or ceiling height is over 75 ft (22.8 m) above the floor level.

c) Supplementary low level, fixed AFFF nozzle systems shall be provided in the hangar areas. Oscillating nozzles may be provided instead of fixed nozzles if the use of fixed nozzles is not feasible. These systems shall be designed at a minimum application rate of 0.10 gpm/square foot (0.006309 L/s per 0.0929 square meter). These systems shall be activated by the overhead detection system. Strategically located manual controls shall also be provided.

d) Foam concrete tanks, proportioning equipment, and deluge valves shall be separated from the main hangar by construction having a minimum of one-hour resistance rating.

2.10.2 01/02 Level Spaces. Automatic, wet-pipe sprinkler system shall be provided in areas of the hangar facility not requiring AFFF sprinkler protection.

Provide manual and automatic fire alarm system reporting to the base-wide system.

Section 3: CORROSION CONTROL HANGAR

3.1 Function. The corrosion control hangar shall be designed to provide space and equipment for the corrosion control processing of aircraft. This corrosion control process can be performed at either a depot level or organizational and intermediate (O/I) level facility as defined in NAVAIR Technical Manual 01-1A-509, Aircraft Weapons Systems Cleaning and Corrosion Control. Facilities designed for depot level maintenance shall be based on de-paint/re-paint of the entire aircraft. Facilities designed for O/I level maintenance shall be based on repair of damaged paint systems and de-paint/re-paint of components only. This does not include de-painting by plastic media blasting (PMB) equipment. Functions performed in the corrosion control hangar include: deicing, limited detergent washing and rinsing, paint stripping, corrosion removal, protective coating application and painting, and finish curing and drying. Refer to NAVAIR Technical Manual 01-1A-509 for detailed functions performed in this facility.

3.2 Location. The corrosion control hangar should be located in proximity to the maintenance hangars and as close as possible to an aircraft washrack. Access between the corrosion control hangar, the maintenance hangar, and the aircraft washrack is required. The prevailing wind should be considered in orienting the building in relation to aprons, taxiways, and parking, to allow for exhaust air dispersal over areas not affected by solvent fumes.

3.3 Architectural and Structural Requirements. Two types of depot level corrosion control hangars are indicated in the facility plates. The Type A corrosion control hangar is designed for carrier aircraft and other small aircraft, and the Type B corrosion control hangar is designed for land-based patrol aircraft. Because both construction and operating costs increase as the volume of the hangar bay increases, depot level corrosion control hangars for aircraft larger than those accommodated by the Type B hangar and O/I level corrosion control hangars shall be individually designed around the specific dimensions of the aircraft concerned. With the exception of the following special requirements, the corrosion control hangar shall be designed using the general architectural and structural requirements for maintenance hangars set forth in the pars. of 2.3.

a) The size of the various aircraft scheduled to use the facility will determine the hangar bay dimensions. Size the bay to accommodate fixed-wing aircraft with wings unfolded, and helicopters and V-22 with rotors in place and unfolded unless it has been determined that aircraft surfaces are accessible with the wings/rotors folded. The following minimum clearances are required to allow proper access for work platforms and to minimize paint overspray on hangar walls and ceilings:

(1) Top of aircraft (vertical fin, radome, rotor head, tail rotor) to underside of ceiling - 5 ft (1.53 m),

(2) Nose of aircraft to hangar door - 10 ft (3.05 m),

(3) Tail of aircraft or tail rotor to exhaust target wall - 10 ft,

(4) Horizontal and vertical clearance from aircraft to open front door - 5 ft.

In addition to these clearances, the depth of the door and exhaust plenum (T) is required to properly size the hangar bay. The equation T = 1/5H defines this depth where H is the height of the aircraft at its highest point plus 5 ft. Note that the depth (T) does not include the thickness of the structure of the door or the filter media.

b) The number of hangar bays for each site shall be based on an analysis of aircraft types, production schedules, hours required for each corrosion control operation, and number of work shifts. If the workload includes a mix of large and small aircraft, a moveable partition at the center of the bay can be used.

c) Ancillary space requirements will vary based on facility requirements. Paint mixing, paint storage, waste paint area, gear equipment and tools, office, non-destructive inspection, strip/rinse, paint spray, and dry storage spaces shall be provided. The size of the rooms is based on the workload. Provide exit doors to the outside for rooms designated for storing or mixing chemicals or paints. Provide a depressed floor slab or door sills with ramps to contain spills.

d) Provide storage space for dry filters. Provide stairs for personnel and a roof mounted jib crane for materials transport to the roof.

e) Consider providing a loading dock.

f) Provide a trench drain at the doorway between the hangar bays and the ancillary spaces.

h) Provide space for work on composite helicopter rotor blades if applicable.

i) An overhead bridge crane is not required in the hangar bays.

j) Locate utilities on the side walls. Use of utility pits in hangar floors is prohibited.

k) Design for the aircraft fully loaded with fuel.

3.3.1 Structure. The hangar structure shall be steel frame with open-web, steel-joist roof. The structure for areas adjacent to the hangar area shall be load-bearing, insulated, concrete-masonry unit construction with open-web, steel-joist roof. The strip/rinse room shall be equipped with a 2-ton (1 814 kg) overhead monorail. The requirements of NFPA 33, Spray Application Using Flammable or Combustible Materials, shall be incorporated into the design.

3.3.2 Walls. With the exception of the following criteria, walls shall be in accordance with par. 2.3.3:

a) Exterior walls of the hangar area shall be a steel frame and girts framing system with insulated preformed (corrugated) metal siding. Exterior walls of the other areas shall be insulated concrete masonry units.

b) The hangar area shall be separated from paint mixing and storage rooms, chemical mixing room, cleaning gear and storage room, corridor, and toilet and locker areas, by 2-hour fire-rated walls.

c) Hangar bays in multiple bay structures shall be separated by 3-hour fire-rated walls.

d) Provide seals at doors, wall penetrations, and building joints in the hangar bays and ancillary spaces to ensure airtight performance to maintain pressure differentials and prevent contamination of the air in the hangar bay.

3.3.3 Roofs. Roofs shall meet the criteria defined in par. 2.3.2.

3.3.4 Floors. Floors shall meet the following criteria.

a) The hangar area floor shall be designed in accordance with criteria in MIL-HDBK-1021/2 and MIL-HDBK-1021/4.

b) Other floors shall be designed in accordance with the criteria manual series on structural engineering, and shall be provided with floor coverings, as specified in MIL-HDBK-1001/2.

c) Use of reflective floor coatings is prohibited. Include a white dry shake floor hardener as the topping on the floor slab in the hangar area.

3.3.5 Ceilings. Aircraft bays and paint storage, mixing, and spray areas shall have water-resistant gypsum ceilings. Provide a 1-hour fire-rated ceiling in paint bays. Suspended acoustical ceilings shall be provided for corridors, toilets, locker rooms, and offices. Suspended acoustical ceiling panels in shower areas shall have vinyl

plastic surfaces. The strip/rinse room ceiling shall be of corrosion-resistant, perforated metal.

3.3.6 Doors and Door Controls. Doors and controls shall be as described in pars. 3.3.6.1 through 3.3.6.3.

3.3.6.1 Hangar Doors. Hangar doors shall be a specialized, insulated, hangar type with swinging leaves. These doors shall serve as an insulated supply air plenum when closed. Provide perforated plates in the supply air plenum, one stationary and one adjustable, which allow for balancing to achieve laminar flow. Use 3/4-inch to 1-inch holes spaced to give approximately 50 percent free area. Plates are to be 18 gauge galvanized steel. Each door leaf shall be a motor-operated unit with a release mechanism, and the doors shall be provided with a means of movement in the event of a power failure. Adequate safety devices shall be installed to prevent injury to personnel and damage to equipment due to moving door sections. Thresholds shall be designed to minimize dirt accumulation and ice buildup.

3.3.6.2 Personnel Doors. Personnel doors between the hangar area and paint and chemical mixing rooms and the corridor shall be 1-1/2-hour B-rated, self-closing fire doors. Hold-open devices shall not be permitted.

3.3.6.3 Other Doors. Other doors shall be as described in par. 2.3.6.5. Provide self-closing, insulated personnel exit doors from each hangar bay. No hold-open devices shall be permitted. Special precautions shall be taken to seal doors between hangar areas and exterior or adjacent spaces. A vehicle access door shall be provided either within or adjacent to the hangar aircraft access doors.

3.3.7 Building Insulation. Building walls, roofs, and floors shall meet the criteria defined in par. 1.9.

3.3.8 Surface Treatment. In addition to the requirements of par. 2.3.8, the side walls, the inside of hangar doors, and the ceiling of the hangar area shall be provided with a light color, smooth surface such as white enameled metal panels.

3.3.9 Exterior Pavement. Exterior paved areas include aircraft and vehicle access and nonorganizational parking. Aircraft pavement shall be in accordance with MIL-HDBK-1021/2 and MIL-HDBK-1021/4. Vehicle access and parking shall be in accordance with facility plates in this handbook and NAVFAC DM-5.04.

3.4 Mechanical Requirements. The design of the corrosion control hangar shall meet the mechanical requirement set forth in pars. 3.4.1 through 3.4.5.

3.4.1 Heating. Heating shall be provided in accordance with MIL-HDBK-1003/3 and as follows:

a) Based on an economic analysis, consideration shall be given to providing a system for the recovery of heat from the exhaust air.

b) The required hangar bay design heating temperature will normally be between 70 degrees F (24 degrees C) and 90 degrees F (32 degrees C). Some activities may require higher temperatures to accelerate curing cycles. Exact requirements for each site must be determined based on materials and production requirements. The hangar area shall be equipped with an automatic cutoff of the heating system when the main hangar doors are open.

Minimum temperature thermostat shall be set at 34 degrees F (1 degree C) to override the heating deactivation switch during door-open periods of subfreezing ambient temperatures. The recovery time for the heating system shall be 30 minutes after door closure.

c) Provide a snow-melting system at the hangar door tracks when the outside design temperature is +25 degrees F (-4 degrees C) or lower and when historical snow data supports the requirement.

d) Refer to the facility plates for design conditions in other hangar spaces.

e) Each bay in the OH area shall be a separate heating zone.

f) Heating shall be suitable for operation in the vapor hazard condition in the hangar bay, flammable storage/mixing areas, and paint equipment cleaning spaces.

3.4.2 Ventilation for Control of Air Contaminants and Flammable Vapors. Ventilation shall be provided in accordance with MIL-HDBK-1003/17, Industrial Ventilation Systems, and NFPA 33. The ventilation system for the hangar area shall furnish 100 percent filtered outside air at a horizontal laminar flow velocity of 100 fpm (0.51 m/s) across the entire cross-section area of the hangar bays for chemical stripping/painting operations for worker safety and overspray control. Provide 50 fpm (0.25 m/s) airflow velocity during the drying cycle and de-paint by grinding operations, and a minimum of 6 air changes per hour for other procedures. Fans should be direct drive or vaneaxial for supply and exhaust. Provide demister in the supply system. Interlock the fans and the compressors so that the compressors cannot operate when the fans are down. Interlock the fans and the fire protection system so that the fans cannot operate when the fire protection system is down. The ventilation system shall maintain a slightly positive static pressure of 0.05 in. (1.25 mm) water gage between the hangar area and the exterior to avoid

infiltration of contaminants into the hangar space which can affect painting operations. Maintain a slightly higher pressure in the adjacent ancillary spaces and overhead ceiling spaces than in the hangar area to keep the hazardous fumes given off by stripping agents from infiltrating into these spaces. Ventilate the space above the hangar bay ceiling to provide a nonhazardous space for light fixtures.

Note: The NAVFAC Criteria Office (Code 15C) and the Naval Facilities Engineering Service Center (NFESC), Naval Occupational Safety and Health (NAVOSH) Branch are attempting to reduce design flow rate for corrosion control hangars. Contact NAVFAC Code 15C prior to initiating final design.

Filters throughout shall be made from noncombustible materials and shall meet approval of the fire protection authorities. Filters upstream of the supply fan and filters in the door plenum shall have an efficiency of 30 percent on the basis of American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 52.1, Gravimetric and Dust Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter. Filters in the exhaust wall shall have an efficiency of 12 percent paint arresting pre-filter plus 60 percent. The type of exhaust filter system shall be determined by an analysis of environmental control regulations at the site. The use of air-assisted airless or electrostatic paint spray methods versus conventional air atomization is recommended to reduce overspray and increase exhaust filter life. The disposal and replacement cost of the replaceable dry-type filters shall be compared with the sludge disposal and water treatment costs of a water wash filter system. Where dry-type exhaust filters are used, visual gauges, audible alarms, or pressure activated devices shall be installed to ensure that the air velocity is maintained. Use of a water wash system will prevent effective heat recovery. Exhaust ventilation from the floor level shall be provided for the paint mixing and storage rooms at the rate of 1 cfm (0.00047 cubic meter/s) per square foot of floor area or 150 cfm (0.071 cubic meter/s), whichever is greater. The ventilation systems for paint mixing and paint equipment cleaning rooms shall be provided in accordance with NFPA 33 and the American Conference of Governmental Industrial Hygienists (ACGIH), Industrial Ventilation, A Manual of Recommended Practice. Consider heat recovery in the ventilation system for those spaces. Exhaust stacks shall be the "no loss" type as shown in ACGIH, Industrial Ventilation, A Manual of Recommended Practice.

3.4.3 Plumbing. Plumbing shall be provided in accordance with NAVFAC DM-3.01 and as follows:

a) Provide steam and hot and cold water.

b) Provide an emergency eyewash/safety shower conforming to ANSI Z358.1, and floor drains in hangar bays, paint mixing rooms, and paint equipment rooms. Refer to par. 3.8.a) for discharge requirements.

c) Provide an oil separator for drains from the hangar area and paint mixing rooms and paint equipment cleaning rooms.

d) Storm-water drains should be located a minimum of 12 in. (305 mm) from the hangar access door rails.

e) Provide AFFF/sprinkler discharge collection/retention system when required by environmental regulations.

3.4.4 Compressed Air. Provide in accordance with NAVFAC DM-3.05.

a) Provide low pressure compressed air at 40 percent to 60 percent humidity and at 125 psig (862 kPa) for shop use. Air shall be oil-free to prevent paint contamination. Air outlets supplying tools requiring lubrication shall be equipped with an in-line lubricator. Rotary oil-free compressors are recommended since this compressed air may be used as a source for breathing air at lower life cycle costs.

b) Provide low pressure compressed air at 20 psig (138 kPa) or higher if required, at 40 percent to 60 percent humidity for breathing air in the hangar bays. Breathing air may be obtained from the oil-free shop air source through final purifiers in each bay or from a separate breathing air compressor and piping system. Breathing air from the oil-free shop air source is preferred because of lower cost.

c) The air outlets (quick connect fittings) for oil-free shop air, lubricated tool air, and breathing air shall be different for each service and shall not be compatible with each other.

d) Typical outlet quantities for each bay are: four breathing and four oil-free shop air and two lubricated tool air. Typical outlet quantities for ancillary spaces requiring air are two oil-free shop air. Verify actual requirements for each site.

e) Ensure the intake for breathing air is located in an uncontaminated area.

3.4.5 Noise and Vibration Control. Mechanical systems and equipment shall be designed to limit noise and vibration in accordance with NAVFAC DM-3.10. Design hangar bay for maximum 75 dBA space average. Provide sound traps to attenuate fan noise down to this level. Noise levels of 55 dBA in the hangar bay area with the ventilation system operating at maximum airflow have been achieved

with careful design attention to fan and duct noise characteristics. Outdoor noise levels should not exceed 75 dBA and shall comply with local regulations.

3.5 Electrical Requirements. Electrical systems shall be provided in accordance with MIL-HDBK-1004/4 and as defined in pars. 3.5.1 and 3.5.2.

Electrical equipment in the hangar bay shall be waterproof when deluge sprinkler protection is provided to prevent equipment damage in the event of testing or accidental discharge of the deluge system.

3.5.1 Electrical Installations. Electrical installations in the following areas shall meet the requirements in NFPA 70 for the specific hazardous (classified) location:

a) Hangar area,

b) Paint and chemical mixing rooms,

c) Paint equipment cleaning room,

d) Paint storage room.

3.5.2 Lighting. The electrical requirements for lighting shall be as follows:

a) Interior lighting in the main hangar bays shall provide 100 footcandles measured 30 in. (0.76 m) above the floor using metal halide fixtures. Future aircraft finishes may require other types of lights. Lighting intensities elsewhere are to be in accordance with MIL-HDBK-1190.

b) Exterior lighting shall be high-pressure sodium vapor where practical and shall be in accordance with MIL-HDBK-1004/4.

c) Provide power outlets in the hangar bays for task lights such as underwing task lighting.

d) Avoid the use of explosion-proof overhead fixtures by providing sealed, ventilated space above the finished ceiling.

3.5.3 Grounding. Two flush floor-ground receptacles, each with a 3/4-in. (19 mm) diameter ground rod, 10 ft (3.05 m) minimum length, shall be provided near the center of the aircraft position, with one on each side of the positioned aircraft. Resistance to ground shall be 25 ohms maximum. Bond ground receptacles together with No. 4 AWG bare copper in or below the hangar floor.

3.6 Weight-Handling Equipment. The monorail hoist shall be in accordance with criteria in NAVFAC DM-38.01 and shall be of sparkproof construction with an explosion-proof motor. Controls shall be operable from the floor level and, when electric, shall meet the requirements indicated in par. 3.5.1.

3.7 Fire Protection. The fire protection design shall be in accordance with MIL-HDBK-1008B. The following features shall be provided:

a) In the hangar bays, requirements of par. 2.10.1 shall be met.

b) In the ancillary spaces, automatic wet-pipe sprinkler system shall be provided.

c) Provide manual and automatic fire alarm system reporting to the base-wide system.

3.8 Environmental. Design shall be in accordance with environmental protection regulations and the requirements as follows:

a) Floor Drains and Waste Disposal System. Design for accidental spill of paint strippers and thinners, paint, cleaning solvents, pretreatment chemicals, fuel, oil, AFFF, etc. Provide for zero discharge from the facility unless the facility will discharge to an existing or new industrial waste treatment facility (IWTF) or to a municipal sewer system. In each case, the IWTF must be capable of handling both the type and volume of the chemicals that will be discharged. Consult the EFD or EFA Environmental Branch for appropriate discharge standards. Provide above-grade containment of accidental spills with appropriate sumps for pumping and cleanup of spilled wastes. Size the containment capacity for the largest possible discharge. Provide a method to ensure that the drains are prevented from clogging.

b) Volatile Organic Compounds (VOC). Every effort should be made to achieve compliance by use of compliant coatings vice use of VOC emission controls.

Section 4: AIRCRAFT WEAPONS ALIGNMENT FACILITY

4.1 Function. The aircraft weapons alignment facility shall be designed to contain space and equipment for the alignment of on-aircraft weapons systems. In addition to weapons systems alignment, which is the process of mechanically and electrically aligning aircraft weapons electronic systems to a common aircraft axis, this facility provides space for on-aircraft electronic maintenance of the weapons system. Refer to NAVFAC P-80 to determine the size of this facility. See the facility plates for single-bay and multiple-bay configurations. For the mechanical alignment of guns attached to aircraft, refer to Section 10.

4.2 Location. The location selected for the aircraft weapons alignment facility must be free of vibration and electromagnetic interference that will adversely affect the weapons alignment. You must provide for the radar radiation clearance distances as shown on the facility plates. With these conditions met, the location that requires the minimum amount of new aircraft access pavement should be selected.

4.3 Architectural and Structural Requirements. In addition to the following special requirements, the aircraft weapons alignment facility shall be designed using the general architectural criteria for maintenance hangars set forth in par. 2.3.

4.3.1 Structure. The facility shall be a steel frame modular structure. Each equipment room shall be provided to house the ground support equipment air conditioner and hydraulic test stand that are applicable to the aircraft being serviced. The mechanical room shall provide for the utilities called for in pars. 4.4 and 4.5.

4.3.2 Walls. Except for the rear wall of the facility, the exterior walls shall be preformed (corrugated), protected, insulated metal panels or insulated concrete masonry units. That portion of the rear wall within the radiation zone shall be completely free of metallic or conductive materials to prevent reflection of the radar beam.

The enclosing walls for mechanical and toilet rooms shall be solid masonry. The enclosing walls for equipment rooms shall have a 1-hour fire rating.

Openings shall be provided in walls of each equipment room for the passage of air conditioning ducts and hydraulic lines, if required by the aircraft slated to use the facility. Openings shall be equipped with sleeves with smooth, rounded edges and top-hinged closure doors.

4.3.3 Roofs. Roofs shall be designed as described in par. 2.3.2.

4.3.4 Floors. Floors shall be designed to withstand the wheel loads of the heaviest fighter or attack aircraft, in accordance with criteria in MIL-HDBK-1021/2 and MIL-HDBK-1021/4.

The floor shall slope to trench drains along the front sliding doors at 1/16 inch per ft (2.0 mm per 305 mm).

4.3.5 Doors. Doors shall be provided that meet the following criteria:

a) Front workbay doors shall be as described in par. 2.3.6.1.

b) The rear wall of the facility shall contain an insulated door 10 ft (3.05 m) wide by 12 ft (3.66 m) high, without a curb or sill, to provide an exit for a tug. The door and door frame shall be constructed of materials that are nonmetallic and nonconductive.

c) Personnel doors between the workbays, equipment, and toilet rooms shall be as described in par. 2.3.6.2.

d) For other doors, provide stock industrial doors in accordance with the appropriate specifications as listed in MIL-HDBK-1000/1.

e) Provide personnel exit doors as described in par. 2.3.6.5.

f) A vehicle access door must be provided either within or adjacent to the hangar aircraft access doors.

4.3.6 Exterior Pavement. Exterior paved areas shall be provided for aircraft access in accordance with MIL-HDBK-1021/2 and MIL-HDBK-1021/4; and vehicle access in accordance with facility plates in this handbook, and NAVFAC DM-5.04.

4.3.7 Harmonization Target. A remote-controlled, horizontally movable harmonization target shall be provided to facilitate aircraft alignment.

4.4 Mechanical Requirements

4.4.1 Heating. Heating shall be provided in accordance with MIL-HDBK-1003/3. The facility shall be equipped with an automatic cutoff of the heating system when the doors are open. Provide a minimum temperature thermostat field set at 34 degrees F (1 degree C) to override the heating deactivation switch during door-open periods of subfreezing ambient temperatures. The recovery time for the heating system shall be 15 minutes after the doors are closed. In a multiple-bay facility, each bay shall be a separate heating zone. A

snow-melting system at the sliding door tracks shall be installed when the outside design temperature is plus 25 degrees F (-4 degrees C) or lower and when historical snow accumulation data supports the requirement.

4.4.2 Ventilation. Ventilation shall be provided in accordance with MIL-HDBK-1003/3.

4.4.3 Air Conditioning. Air conditioning shall be provided in accordance with MIL-HDBK-1003/3 and MIL-HDBK-1190. Automatic thermostatic control shall be provided, and equipment shall be shut down when not required for cooling.

4.4.4 Noise and Vibration Control. Hot and cold water shall be provided for one toilet room at each facility, in accordance with NAVFAC DM-3.10. Storm water drains should be located a minimum of 12 in. (305 mm) from the hangar access door rails.

4.5 Electrical Requirements. Electrical systems shall meet the criteria of MIL-HDBK-1004/4 and pars. 4.5.1 through 4.5.3.

Electrical equipment in the hangar bay shall be waterproof when deluge sprinkler protection is provided to prevent equipment damage in the event of testing or accidental discharge of the deluge system.

4.5.1 Power Outlets. Each bay shall be provided with the following power outlets at the workbenches: single-phase, 120 V, 20 amperes, 60 Hz; three-phase, 480 V, 60 Hz; three-phase, 115/200 V, 400 Hz; and 28 V direct current. The ampacity of three-phase and direct-current outlets shall be as required by the using agency for the specific facility. Refer to NFGS-16268, 400-Hertz (Hz) Solid State Frequency Converter for 400 Hz power requirements.

4.5.2 Lighting. The interior lighting in the workbays shall be an energy-efficient type, such as high-pressure sodium vapor. Interior lighting in other spaces and task lighting above workbenches shall be fluorescent. Design for lighting intensities shall be in accordance with MIL-HDBK-1190 and shall take into consideration the reflectance of wall and floor surfaces.

A system of flashing warning lights shall be provided to identify workbays where aircraft radar is operating.

Exterior lighting shall be of the high-pressure sodium vapor type where practical and shall be in accordance with MIL-HDBK-1004/4.

4.5.3 Grounding. Two flush floor-ground receptacles, each with a 3/4-in. (19 mm) diameter ground rod, 10 ft (3.05 m) minimum length, shall be provided near the center of the aircraft position, with one on each side of the positioned aircraft. Resistance to ground shall be 25 ohms maximum. Ground receptacles shall be bonded together with No. 4 AWG bare copper in or below the workbay floor.

4.6 Fire Protection. The fire protection design shall be in accordance with MIL-HDBK-1008B and par. 2.10.

Section 5: PAINT FINISHING HANGAR

5.1 Function. The paint finishing hangar shall be designed for use only as a part of a NADEP or a selected intermediate maintenance activity as determined by the major claimant and approved by the Shore Development Board for cleaning, painting, and curing aircraft surfaces using production line methods. In addition to the workbays, storage and administrative spaces shall be provided.

5.2 Location. The paint finishing hangar shall be located with due regard to the requirement for aircraft and vehicle access. In orienting the building, consider the prevailing wind in relation to the intake and exhaust of large volumes of air for the ventilation system.

5.3 Arrangement. The workbays shall be arranged so that each has ready access to the outside and to equipment and storage spaces of the hangar. Workbays in which cleaning and stripping are done shall be isolated from workbays in which painting and curing are done. Administrative spaces such as work control offices may be accommodated in mezzanines. Mechanical equipment rooms shall be provided with outside access.

5.4 Architectural and Structural Requirements. Each hangar shall be designed for the size and configuration of the specific aircraft to be handled. Workbay dimensions, ceiling heights, and door openings are determined by the aircraft dimensions. The number of workbays is determined by the workload. In addition to the following specific requirements, the paint finishing hangar shall be designed using the general architectural criteria for maintenance hangars, as set forth in par. 2.3.

5.4.1 Structure. Noncombustible construction materials shall be used in the hangar construction. Reinforced concrete slabs (with perimeter insulation) and columns with insulated masonry exterior walls are preferred. Refer to the criteria manual series on structural engineering. The requirements of NFPA 33 shall be incorporated into the design of this facility.

5.4.2 Roofs. Roofs shall be designed in accordance with par. 2.3.2.

5.4.3 Walls. Workbays and spaces used for paint and chemical mixing shall be isolated with 2-hour fire-rated walls.

5.4.4 Floors. Workbay floors shall be designed in accordance with the criteria in MIL-HDBK-1021/2 and MIL-HDBK-1021/4. Other floors shall be designed in accordance with the criteria manual series on structural engineering and shall be provided with floor coverings, as designated in MIL-HDBK-1001/2.

5.4.5 Ceilings. Administrative and personnel spaces shall be provided with a noncombustible, suspended acoustical ceiling.

5.4.6 Doors and Door Controls. Doors shall be designed in accordance with par. 3.3.6.

5.4.7 Building Insulation. Building walls, roof, and floor shall be insulated in accordance with par. 1.9.

5.4.8 Surface Treatment. In addition to the requirements in par. 2.3.8, walls, inside surfaces of doors, and ceilings of workbays shall be provided with a light-colored, smooth, hard surface.

5.4.9 Exterior Pavement. Exterior paved areas of the hangar include aircraft and vehicle access and nonorganizational parking. Aircraft pavement shall be in accordance with MIL-HDBK-1021/2 and MIL-HDBK-1021/4, and vehicle access and parking shall be in accordance with NAVFAC DM-5.04, and MIL-HDBK-1190.

5.5 Mechanical Requirements. The paint finishing hangar shall be designed to meet the criteria set forth in pars. 5.5.1 through 5.5.6.

5.5.1 Heating. Heating shall be provided as described in par. 3.4.1.

5.5.2 Ventilation. Provide ventilation in accordance with par. 3.4.2.

5.5.3 Air Conditioning. Provide air conditioning for administrative areas in accordance with MIL-HDBK-1003/3.

5.5.4 Plumbing. Plumbing shall be provided in accordance with par. 3.4.3. Industrial waste system, if required by facility pollution control procedures for control of paint stripping residue, shall be provided. Storm water drains shall be located a minimum of 12 in. (305 mm) from the hangar access door rails.

5.5.5 Compressed Air. Compressed air shall be provided in accordance with par. 3.4.4.

5.5.6 Noise and Vibration Control. Mechanical systems and equipment shall be designed to limit noise and vibration in accordance with NAVFAC DM-3.10.

5.6 Fire Protection. The fire protection design shall be in accordance with MIL-HDBK-1008B and par. 2.10.

5.7 Environmental Controls. The type of environmental controls required will depend on the pollution abatement regulations at the site and the type and quantities of paints expected to be used. Environmental controls can be a major construction and operating cost item; therefore, an accurate determination of regulations and paints (existing and proposed) is required prior to design.

Section 6: AVIATION LIFE SUPPORT SYSTEMS SHOP

6.1 Function. The Aviation Life Support Systems Shop shall be designed to contain space and equipment for the inspection, repair, and repacking of aviators' safety and survival equipment. Safety and survival equipment includes parachutes, life rafts, antiexposure wet suits, flotation vests, liquid oxygen systems, onboard oxygen generating systems, and ejection seats. Under current maintenance techniques, drying towers for parachutes are not normally needed and must be justified on an individual basis. The Aviation Life Support Systems Division is broken down into four separate work centers besides the division offices and Production Control Shop work centers and include:

a) The Parachute Shop,

b) The Aviation Safety Equipment Shop,

c) The Oxygen Regulator and Equipment Shop, and

d) The Ejection Seat Shop.

The space and facility requirements for the Ejection Seat Shop should be justified separately, as most seat work is now transitioning from organizational level maintenance to depot with no impact on I level facilities.

6.2 Location. The Aviation Life Support Systems Shop shall be located in proximity to the hangars and within or near the intermediate maintenance shop complex. This shop shall be oriented to minimize the possibility of dust, dirt, or moisture blowing into the building.

6.3 Architectural Requirements

6.3.1 General. The Aviation Life Support Systems Shop shall meet the following architectural requirements:

a) It shall be a single-story structure with an interior clearance to the finished ceiling to suit the equipment maintained. Where MK-20 life rafts are supported, an interior clearance to the finished ceiling or suspended lighting of 18 ft (5.49 m) is required in the Aviation Safety Equipment Shop to turn the raft over during inflation checks. The building is to be of modular steel girder construction with insulated concrete masonry unit (CMU) walls, insulated preformed (corrugated) metal walls, or a combination of the two.

b) The roof shall be of insulated metal roof panels or insulated built-up roofing assemblies, which meet the requirements of Underwriters Laboratories, Inc. (UL), Building Materials Directory, for fire-acceptable roof deck construction or Factory Mutual Engineering Corporation (FM), Approval Guide for noncombustible deck construction.

c) Access to the shops shall be through two pairs of double doors forming a foyer. Double doors shall also be required for material and equipment passage into the workrooms. Exterior doors to workrooms shall be equipped with full contact dustproof gaskets and automatic door bottoms.

d) Windows shall not be permitted in areas where direct sunlight can reach parachute fabric. If used, windows shall be double glazed or shaded, depending upon local climatic conditions.

e) Refer to the facility plates and NAVAIR 13-1-6.2, Manual Aviation - Crew Systems Parachutes, for various layouts and other criteria for this shop.

6.3.2 Packing Room. The shop shall contain a packing room with space for 45 ft (14.6 m) parachute packing tables. Tables shall be located so that there exists a minimum of 6 ft (1.83 m) from the walls at the sides and ends and 4 ft (1.22 m) between tables. The tables shall be 36 in. (914 mm) wide by 36 in. (914 mm) high and have smooth hard tops of a color to reduce reflection and eyestrain. Where tables are sectional to permit their deployment, edge treatment shall be such that parachute fabric cannot be snagged. A suspended acoustical tile ceiling system shall be provided in the packing room for the purpose of eliminating dust and dirt accumulation in the overhead area. The floor in this area shall be steel-trowel-finished concrete or resilient tile.

6.3.3 Sewing and Fabrication Room. The shop shall contain a sewing and fabrication room with space for cutting tables and sewing machines for repair and fabrication of parachutes and other survival equipment. Space shall also be provided for storage of fabric and materials.

6.3.4 Parachute Storage. The shop shall contain facilities for repacked parachutes to be stored in smooth surfaced individual bins 20 in. (508 mm) wide, 26 in. (660 mm) high, and 25 in. (635 mm) deep. To provide for air circulation, bins shall be open both front and back. The height shall not exceed 70 in. (1 778 mm) from floor to top of bin, and the bottom shelf shall be l8 in. (457 mm) from the floor.

6.3.5 Flotation Room. Doors between the flotation room and other parts of the shop shall be fully weatherstripped and equipped with automatic door bottoms to eliminate transfer of talcum powder to other parts of the building.

6.3.6 Oxygen and Carbon Dioxide Room. The shop shall contain a separate enclosed room for servicing and testing oxygen and carbon dioxide equipment and components. Double doors shall be provided to permit moving large test equipment into the area. A covered and protected area shall be provided outside of the building and adjacent to the oxygen room for storage of oxygen and nitrogen bottles. The area shall be arranged to permit storage of bottles on skids and handling of skids by forklifts. Openings shall be provided in the exterior wall for an exhaust line from test equipment and for piping from the oxygen and nitrogen storage area.

6.3.7 Exterior Pavement. The exterior paved areas shall include vehicle access and nonorganization vehicle parking. Refer to facility plates in this handbook and MIL-HDBK-1190 for parking criteria.

6.4 Mechanical Requirements. The Aviation Life Support Systems Shop shall meet the mechanical requirements defined in pars. 6.4.1 through 6.4.4.

6.4.1 Heating, Ventilating, and Air Conditioning. Heating, ventilating, and air conditioning (HVAC) shall be provided in accordance with MIL-HDBK-1003/3 and as follows:

a) Ductwork delivering supply air to the packing room shall be run above suspended acoustical ceiling or be located to prevent dirt accumulation on top of the duct over packing tables.

b) Air conditioning shall be provided to limit the relative humidity to 50 percent, plus or minus 10 percent.

c) Humidification shall be provided in parachute packing and storage areas, as required by the locality of the facility, to maintain the relative humidity within the acceptable zone shown in Figure 2.

d) The raft room shall be kept at a negative pressure relative to adjacent spaces to prevent spread of talcum. A makeup air and local exhaust system with dust collector is required to control talcum dust. The design shall be in accordance with the ACGIH, Industrial Ventilation, A Manual of Recommended Practice.

6.4.2 Plumbing. Plumbing shall be provided in accordance with NAVFAC DM-3.0l and as follows:

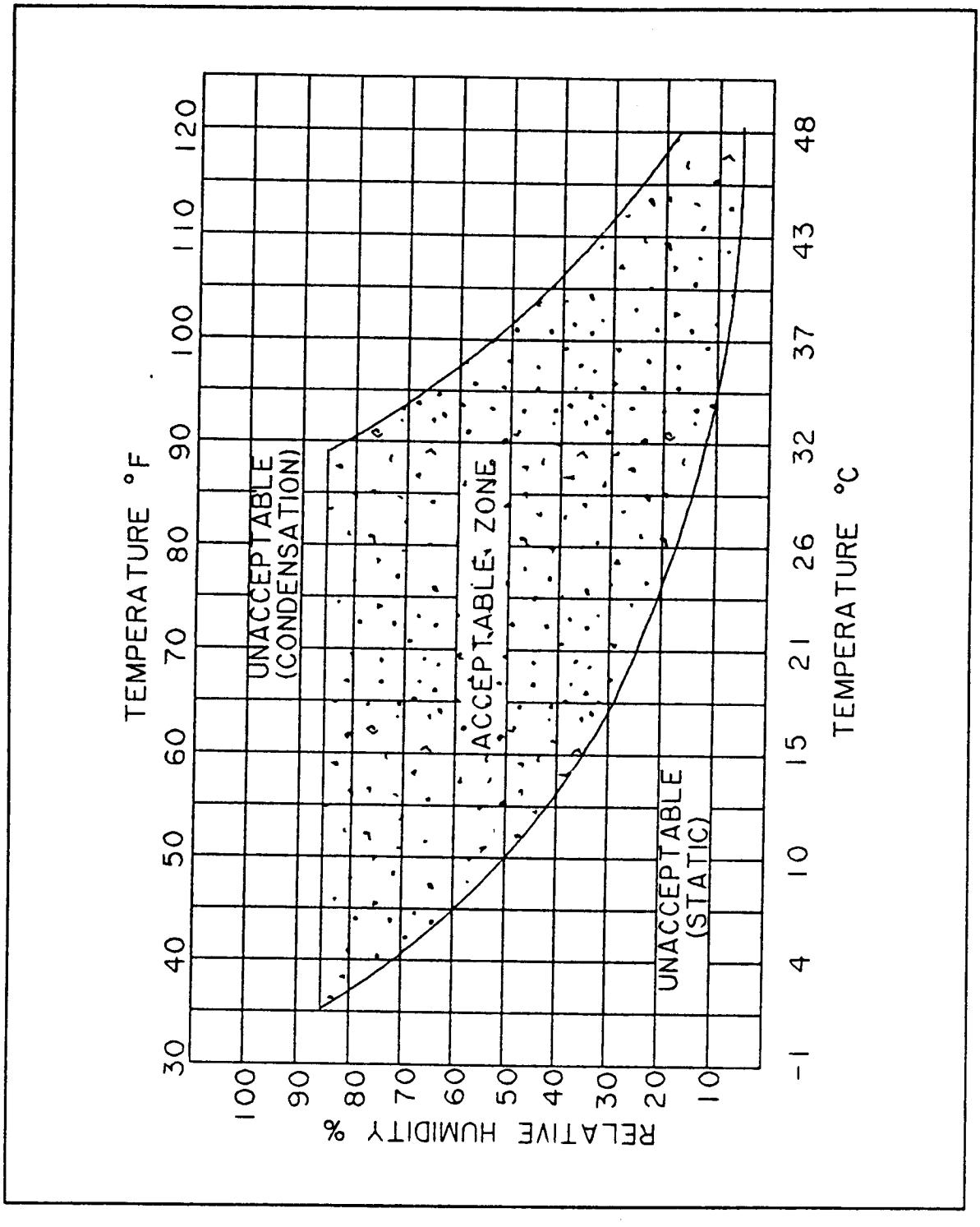


Figure 2
Parachute Packing and Storage Relative Humidity Limits

a) Hot and cold water and floor drains shall be provided in toilets, cleaning gear room, raft shop, and the parachute washing machine.

b) A leak test tank shall be provided in the Personal Flotation Equipment Shop.

6.4.3 Compressed Air and Vacuum. Compressed air and vacuum systems shall be provided in accordance with NAVFAC DM-3.05 and as follows:

a) Low pressure, oil-free compressed air at 30-60 psi (207-414 kPa) is required in the survival equipment room and the flotation room. The air supply shall have a minimum capacity of 50 cfm (0.024 cubic meters/s) and shall be adequate to inflate large life rafts in the flotation room.

b) A vacuum source shall be provided in the personal flotation room and raft shop for deflation of rafts and vests. The preferred method is portable, industrial-grade shop vacuum cleaners.

6.4.4 Noise and Vibration Control. Mechanical systems and equipment shall be designed to limit noise and vibration in accordance with NAVFAC DM-3.10.

6.5 Electrical Requirements. The Aviation Life Support Systems Shop shall meet the electrical requirements of MIL-HDBK-1004/4 and pars. 6.5.1 through 6.5.2.

6.5.1 Power Outlets. All areas shall be provided with single-phase, 120 V, 20 ampere, 60 Hz outlets spaced as required by NFPA 70. The sewing and fabrication room shall be provided with three-phase, l20/208 V, 20 ampere, 60 Hz outlets located as required by the using agency for the specific facility. Three-phase, l20/208 V, 20 ampere, 60 Hz power shall be provided for test equipment in the oxygen room and for pressurizing equipment in the carbon dioxide transfer room.

6.5.2 Lighting. Lighting throughout the facility shall be fluorescent. Fixtures in the packing room shall be recessed when suspended ceilings are provided, run parallel to the packing tables, and located so that shadows are not cast across work surfaces. Exterior lights shall be the high-pressure, sodium vapor type where practical. Lighting intensities shall be designed in accordance with MIL-HDBK-1004/4 and the Illuminating Engineering Society of North America (IES), Lighting Handbook.

Section 7: ENGINE MAINTENANCE SHOP

7.1 Function. The Engine Maintenance Shop (Power Plant Division) shall be designed to contain space and equipment for maintaining aircraft engines, propellers, helicopter rotors (rotor dynamics), and auxiliary fuel tanks and air-to-air refueling stores. Individual justification based on assigned aircraft or maintenance capability must be provided to authorize space for propeller, rotor dynamics, and auxiliary fuel stores maintenance (refer to NAVFAC P-80).

7.2 Location. The Engine Maintenance Shop should be in close proximity to the engine test cells and the maintenance hangars. Direct access to aprons is not required.

7.3 Architectural and Structural Requirements. For architectural and structural requirements, refer to MIL-HDBK-1001/1, Basic Architectural Requirements and Design Considerations, MIL-HDBK-1002/2, and pars. 7.3.1 through 7.3.4.

7.3.1 High Bay. The main work area shall be designed for engine teardown and reassembly and equipped with an overhead bridge crane of 6-ton capacity. A second overhead crane of 6-ton (5 443 kg) capacity shall be installed if justified according to NAVFAC P-80. A clear height of 24 ft (7.3 m) shall be maintained between the floor and the hook of the bridge crane. Access from outside shall be provided through four 20-ft (6.1 m) wide, l0-ft (3.05 m) high rollup doors.

7.3.2 Shop Areas. The shop areas shall be designed to house the rotor dynamics, propeller, and auxiliary fuel store work centers, as well as engine AWP, AWM, and ready for issue (RFI) storage, expendable supplies, and cleaning (steam and solvent) areas with the number and size of cleaning tanks determined by the type and number of aircraft being supported. Mechanical equipment and transformer rooms, as well as welding and accessory shops, shall also be located in the shop areas. Sizing of the Rotor Dynamics Shop is dominated by the length of the main rotor blades. The Propeller Shop requires an 18-ft (5.5 m) ceiling to accommodate propellers on stands and should have a 2-ton (1 814 kg) crane. Both the Rotor Dynamics Shop and Propeller Shop shall be designed to eliminate drafts during blade balancing operations. The Auxiliary Fuel Stores Shop shall be designed to accommodate extending and retracting the 45-ft (13.7 m) fuel hose. A waste oil/solvent containment and storage facility shall be provided.

7.3.3 Other Spaces. Toilet facilities shall be provided with lockers and showers for men and women. The coffee mess shall be provided and equipped with a sink and utilities for dispensing machines. A cleaning gear room shall be provided. Office spaces shall contain areas for a division officer, division personnel, training, and naval engineering technical specialist/naval aviation

engineering service unit personnel. Resilient floor covering and washable wall finish shall be provided in the administrative spaces.

7.3.4 Exterior Pavements. Exterior paved areas include vehicle access, outside storage for sealed engine containers, and nonorganizational vehicle parking.

7.4 Mechanical Requirements. The mechanical requirements for the Engine Maintenance Shop are defined in pars. 7.4.1 through 7.4.6.

7.4.1 Heating. Heating shall be provided in accordance with MIL-HDBK-1003/3.

7.4.2 Ventilation. Ventilation and exhaust systems shall be designed in accordance with MIL-HDBK-1003/3 and provide:

a) Mechanical ventilation for spaces that are not air conditioned,

b) Heated outside air to the cleaning and welding areas, and

c) Exhaust systems in accordance with the ACGIH, Industrial Ventilation, A Manual of Recommended Practice, for the cleaning and welding areas to remove solvent and welding fumes from the building to provide a safe work environment.

7.4.3 Air Conditioning. Air conditioning shall be provided for personnel/administrative spaces in accordance with MIL-HDBK-1003/3.

7.4.4 Plumbing. Plumbing shall be provided in accordance with NAVFAC DM-3.01 and as follows:

a) Steam shall be provided at 30 psi (207 kPa) with a capacity of 200 pounds per hour (0.025 kg/s) to the steam cleaning room. Electricity and water supplies shall be provided if portable steam generators are used in lieu of building steam system.

b) Hot and cold water shall be provided to the cleaning area, inspection area, coffee mess, cleaning gear room, and toilets.

c) An oil/water separator shall be provided for drainage systems from solvent and spray cleaning and steam cleaning areas as required for compliance with environmental regulations.

d) A waste recovery system shall be provided for film developing operations to segregate and collect silver bearing waste in accordance with NAVSUPINST 4570.23, Navy Precious Metals Program (PMP).

7.4.5 Compressed Air. Low pressure compressed air at 125 psi (862 kPa) shall be provided in accordance with NAVFAC DM-3.05 to the main work area and shop areas. Air outlets shall be provided, at a spacing of 24 ft (7.3 m) in the main work area.

7.4.6 Noise and Vibration Control. Mechanical systems and equipment shall be designed to limit noise and vibration in accordance with NAVFAC DM-3.10.

7.5 Electrical Requirements. Electrical systems shall be provided in accordance with MIL-HDBK-1004/4, and as defined in pars. 7.5.1 through 7.5.3.

7.5.1 Power Outlets. Power outlets shall meet the following criteria:

a) Single-phase, l20 V, 20 ampere, 60 Hz outlets shall be provided in all areas.

b) Three-phase, 480 V, 60 Hz outlets shall be provided in the Welding Shop and Inspection Shops and at a spacing of 24 ft (7.3 m) in the main work area and in the propeller, rotor dynamics, and auxiliary fuel store work centers.

c) Three-phase, 115/200 V, 400 Hz outlets shall be provided in the accessory shop.

d) The ampacity of three-phase outlets shall be as required by the using agency for the specific facility.

7.5.2 Lighting. Interior lighting shall meet the following criteria:

a) Interior lighting shall be an energy-efficient type such as high-pressure sodium vapor in the high bay area. Other interior lighting will be fluorescent.

b) Exterior lighting shall be high-pressure sodium vapor where practical.

c) Design for lighting intensities shall be in accordance with MIL-HDBK-1190.

d) Photo laboratory lighting.

7.5.3 Communications. An intercommunications system to allow two-way voice communications shall be provided between the production control office and the major shop areas. A 3M communications system outlet shall be provided in the production control office for connection to the AIMD office located in another building (refer to par. 1.8).

7.6 Weight-Handling Equipment. The overhead bridge crane and monorail hoist shall be in accordance with criteria in NAVFAC DM-38.01 and the following requirements:

7.6.1 Bridge Crane. Each overhead bridge crane shall have an electric, motorized bridge, trolley, and hoist and shall be 6-ton (5 443 kg) capacity. The trolley and bridge shall be capable of operating at a slow speed of 15 to 20 ft/min. (0.076 to 0.10 m/s) for positioning loads and at a high speed for moving loads of 60 ft/min. (0.305 m/s). The hoist shall be capable of operating at a slow speed of 3 to 4 ft/min. (0.015 to 0.02 m/s) and at a high speed of 12 ft/min. (0.061 m/s), also refer to NFGS-14637.

7.6.2 Motor and Controls. The bridge, trolley, and hoist controls shall provide for two-speed reversing of a two-speed squirrel-cage motor. The controls shall be equipped with reduced voltage starting for the motors. Controls shall be operable from the floor.

Section 8: AIRFRAMES SHOP

8.1 Function. The Airframes Shop shall be designed to contain space and equipment for maintaining aircraft at the intermediate maintenance level. The Airframes Division, in addition to the division offices, has 11 separate work centers organized in four branches as follows:

a) The Structures Branch consists of a Structures Shop, Paint Shop, Welding Shop, Machine Shop, Wheel and Tire Shop, and Composites Shop.

b) The Hydraulics/Pneumatics Branch consists of a Hydraulics Shop, Brake Shop, and Strut Shop.

c) The NDI (Nondestructive Inspection) Branch consists of a Radiography Shop, Electrical/Chemical Shop, and an Electroplating/ Anodizing Branch. This branch is not normally required and is authorized on an individual AIMD basis. Refer to NAVFAC P-80 to determine allowance, size, and space requirements and additional special requirements for this facility.

8.2 Location. The Airframes Shop shall be located in proximity to the maintenance hangars within the intermediate maintenance shop complex. Direct unobstructed vehicle access is required.

8.3 Architectural Requirements. The Airframes Shop shall be designed to meet the requirements of pars. 8.3.1 through 8.3.8.

8.3.1 Walls. Walls shall be insulated CMUs, insulated preformed (corrugated) metal panels, or a combination of both.

8.3.2 Roof. The roof shall be constructed of insulated metal panels or insulated built-up roofing in accordance with par. 2.3.2.

8.3.3 Floors. Floors in the shop area shall be designed for loads as specified in MIL-HDBK-1002/2, and shall have nonslip, easily cleaned finishes.

8.3.4 Doors. Double doors into shop areas shall be as large as practical to permit the installation of large equipment.

8.3.5 Finishes. Architectural finishes of the personnel spaces shall be in accordance with MIL-HDBK-1001/1.

8.3.6 Clean Room. A horizontal laminar flow clean room, designed in accordance with MIL-HDBK-1028/5, Environmental Control - Design of Clean Rooms, shall be provided as a part of the hydraulics and pneumatic shop area.

8.3.7 Paint Shop. The paint shop shall meet the requirements of NFPA 33.

8.3.8 Exterior Pavement. For parking and access criteria, refer to MIL-HDBK-1190 and facility plates in this handbook.

8.4 Mechanical Requirements. The Airframes Shop shall be designed to meet the requirements of pars. 8.4.1 through 8.4.8.

8.4.1 Clean Room. Mechanical requirements for the prefabricated clean room shall be in accordance with criteria in MIL-HDBK-1028/5.

8.4.2 Heating. Heating shall be provided in accordance with MIL-HDBK-1003/3. Design for an infiltration rate of two air changes per hour in the OH space.

8.4.3 Ventilation. Ventilation shall be provided in accordance with MIL-HDBK-1003/3 for spaces that are not air conditioned as follows:

a) Exhaust systems with filtered and heated makeup air shall be provided for the painting, welding, sandblasting, cleaning and plating, and fiberglass/plastics shops.

b) Ventilation for the paint shop shall meet the requirements of NFPA 33.

8.4.4 Air Conditioning. Air conditioning shall be provided in accordance with MIL-HDBK-1003/3 for administrative areas, the training room, library, first aid room, production control office, X-ray exposure room, X-ray film process room, and file room.

8.4.5 Plumbing. Plumbing shall be provided in accordance with NAVFAC DM-3.0l and as follows:

a) Hot and cold water and floor drains shall be provided in all shop areas except those for tire and wheel, machine shop, and structures shop areas.

b) Steam shall be provided in the cleaning and plating, painting, and nondestructive testing work areas. The steam supply should normally be 30 psi (207 kPa), with a capacity of 200 pounds per hour (0.025 kg/s) per cleaning station.

c) A waste recovery system shall be provided for film developing operations to segregate and collect silver bearing waste in accordance with NAVSUPINST 4570.23.

d) A safety shower/eyewash shall be provided with fixtures as shown on facility plates in this handbook.

8.4.6 Compressed Air. Low-pressure compressed air at 125 psi (862 kPa) shall be provided in shop areas in accordance with NAVFAC DM-3.05.

8.4.7 Nitrogen. Gaseous nitrogen, supplied by the using agency in portable cylinders at pressures to 4000 psi (27 579 kPa), is required in the tire and wheel work area. A nitrogen bottle rack and manifold assembly, complete with pressure regulator, pressure gages, and flexible hose, shall be provided to connect to the nitrogen cylinders.

8.4.8 Noise and Vibration Control. Mechanical systems and equipment shall be designed to limit noise and vibration in accordance with NAVFAC DM-3.10.

8.5 Electrical Requirements. Electrical systems shall be provided in accordance with MIL-HDBK-1004/1, Preliminary Design Considerations and as defined in pars. 8.5.1 through 8.5.3.

8.5.1 Power Outlets. Power outlets shall be provided in accordance with the following criteria:

a) Single-phase, l20 V, 20 ampere, 60 Hz convenience outlets shall be provided in all spaces with spacing as required by NFPA 70.

b) Three-phase, 480 V, 60 Hz outlets shall be provided in the hydraulic/pneumatic shop, structures shop, and welding shop areas.

c) Three-phase, l20/208 V, 60 Hz outlets shall be provided in the cleaning and plating shop, paint shop, and nondestructive testing area.

d) 28 V direct current outlets shall be provided in the hydraulic/pneumatic shop area.

e) The ampacity of three-phase outlets shall be as required by the using agency for the specific facility.

8.5.2 Lighting. Lighting shall be provided in accordance with the following criteria:

a) Interior lighting shall normally be fluorescent.

b) Exterior lighting shall be of the high-pressure sodium vapor where practical.

c) The lighting intensities shall be designed in accordance with MIL-HDBK-1190.

8.5.3 Communications. A 3M communications system outlet shall be provided in the production control office for connection to the AIMD offices located in another building (refer to par. 1.8). An intercommunications system to allow two-way voice communication shall be provided between the production control office and the major shop areas.

8.6 Weight-Handling Equipment. The monorail hoist shall have an electrically operated trolley and hoist with pushbutton, independent controls and shall be in accordance with criteria in NAVFAC DM-38.01.

Section 9: AVIONICS SHOP

9.1 Function. The Navy and Marine Corps Avionics Shop shall be designed to contain space and equipment for intermediate maintenance and repair of electronic and electrical airborne equipment and systems. In addition to the avionics division offices and a supply area, the division has 10 branches as follows:

a) The Avionics Corrosion Control Branch.

b) The Communications/Navigation Branch consisting of a Communications Shop, Navigation Shop, Computer Shop and COMSEC/CRYPTO Repair Shop.

c) The Electrical/Instrument Branch consisting of an Electric Shop; Instrument Shop; Battery Shop - lead acid; Battery Shop - Ni-Cad; CSD/Generator Shop; Inertial Navigation Shop; and MIARS Shop.

d) The Fire Control Branch consisting of an AWG-9 Shop and AWG-10 Shop.

e) The Radar/Electronic Countermeasure (ECM) Branch consisting of a Radar Shop, ECM Shop, DECM Shop, FLIR Shop, and POD Shop.

f) The Semiautomatic Checkout Equipment (SACE)/ATE Branch consists of a SACE/BACE Shop, SACE AFC Shop, SACE DIANE Shop, SACE Radar Shop, Weapons Systems Missile Component Shop, FTE/DTS Shop, VAST Shop, and VAST Calibration Shop.

g) The Anti-submarine Warfare (ASW) Branch consists of a Julie/Jezebel Shop, Magnetic Anomaly Detection (MAD) Shop, and Sonobuoy Shop.

h) The PME Branch/Field Calibration Activity consists of a PME Receipt and Issue, PME Calibration Shop, and PME Repair Shop.

i) The Reconnaissance/Photo Branch.

j) Module/Micro-miniature Repair Branch consists of a Module Test/Troubleshooting Shop, Micro-miniature Repair Shop, and Cable/Connector Repair Shop. Few avionics facilities include all possible shops. Refer to NAVFAC P-80 to determine allowance, size, and space for this facility.

NOTE: The Battery Shop is included in the sizing of the Avionics Shops; however, they are separate facilities (Category Code 218-50) in the real property system. Due to expanded use of mobile maintenance facilities (MMFs) by both Navy and Marine units, the

Avionics Shop size may be adjusted. When MMFs are used, special studies must determine the reduction factor, as some MMFs are total support and others are only partial support for any specific unit.

9.2 Location. The Avionics Shop should be located in proximity to the maintenance hangars within the Intermediate Maintenance Shop complex. The MAD building should be located in an electronic transmission-free area that is a minimum of 200 ft (61 m) from automotive traffic or taxiways. Direct, unobstructed vehicle access to the loading area is required.

9.3 Architectural Requirements. The Avionics Shop shall be single story with an expandable floor plan. Use of interior partitions shall be minimized to permit maximum flexibility in space allocation and equipment modification and rearrangement.

9.3.1 Interior Partitions. Interior partitions, where possible, shall be movable.

9.3.2 Floors. Floors in the shop areas shall be designed for a live load of 300 psf (1 465 kilograms/square meter) and shall have an epoxy-hardened, dustproof, slip-resistant finish.

9.3.3 Doors. Doors shall be a regular industrial type except as required for security spaces.

9.3.4 Finishes. Interior finishes shall be in accordance with MIL-HDBK-1001/2.

9.3.5 Exterior Pavement. Exterior pavement shall be provided for vehicle access and nonorganizational parking. Refer to MIL-HDBK-1190 for parking criteria.

9.3.6 Clean Room. The clean room shall be designed in accordance with MIL-HDBK-1028/5.

9.3.7 Electrical Area. The electrical area requires a freestanding concrete platform, approximately 6 ft (1.83 m) square, on a special isolated foundation for maintenance of gyro systems. Refer to the latest equipment contractors specifications at the time of design.

9.3.8 CSD/Generator Room. Sound attenuation treatment shall be provided for the CSD/generator room.

9.3.9 Battery Room. The battery room shall be designed in accordance with criteria in NAVFAC DM-28.04, General Maintenance Facilities.

9.3.10 MAD Building. The MAD building shall be constructed entirely of nonmagnetic materials.

9.3.11 Radar Test Facility. For avionics facilities needing to test radar when they are transmitting, a remote radar test facility shall be provided. Requirements for this type of facility are as follows:

a) Separate areas required are a workroom, office, toilet facilities, crew lounge, utility room, and nitrogen storage and testing rooms.

b) The facility shall be located so that the radar can be beamed across an open area with no permanent structures in the field of the sweep of the radar beam.

c) A radar dome shall be provided for each radar workbench in the wall of the facility in the direction the radar is to be beamed. The radar dome shall be constructed of materials as required in Section 00800, par. 10, of NAVAIR Technical Manual, 01-1A-22, Organizational, Intermediate, and Depot Maintenance, Aircraft Radomes and Antenna Covers. The radar dome shall be designed so that with the radar dish in the dome, the sweeping dish of the radar is beyond any building component, thus eliminating the possibility of radiation being reflected back into the work area.

d) A track system shall be provided on each workbench so that the dish of the radar can be moved into the dome for tests with the radar transmitting.

e) A large window, for visual observation of the area covered by the radar beam, shall be provided adjacent to each radar dome. The window shall be of a lead-free material.

f) Window frames, workbench tracks, and any portion of the building near the radar dome shall be of a material that will not reflect radiation from the transmitting radar.

g) Where more than one workbench is used in a facility, a partition with RFI shielding shall be installed between the benches. Refer to MIL-HDBK-1195, Radio Frequency Shielded Enclosures, for typical shielding details.

h) Equipment shall be provided to continuously monitor the level of radiation near operating personnel while the radar is transmitting.

i) A monorail system shall be provided to allow moving the radar units between the unloading/loading area outside of the building, storage area, nitrogen test area, and workbenches. For requirements on monorail hoist, refer to par. 9.7.

j) NAVAIR Technical Manual, 16-1-529, Volume I, Electromagnetic Radiation Hazards (Hazards to Personnel, Fuel, and Other Flammable Material), contains information concerning various radio frequency sources and the hazards to personnel in the vicinity of operating radar equipment.

9.3.12 Avionics Building. The avionics building shall be a secured area. Outside access shall be limited. The ECM and COMSEC/CRYPTO Repair Shops require added security measures within the division building.

9.3.13 PME Branch and Production Control Office. The PME Branch and Production Control Office should have an outside access.

9.3.14 Production Control Office. The Production Control Office should be adjacent to a supply support area. This supply support area may include a loading dock at the larger AIMDs.

9.4 Mechanical Requirements. The mechanical requirements of the Avionics Shop shall conform to the criteria defined in pars. 9.4.1 through 9.4.6.

9.4.1 Heating, Ventilating, and Air Conditioning. Heating, ventilating, and air conditioning, including humidity and dust control, shall be provided throughout shop spaces, in accordance with MIL-HDBK-1003/3. Inside design temperature for shop spaces shall be 75 degrees F (24 degrees C), with a relative humidity of 50 percent for cooling and 65 degrees F (18 degrees C) for heating. Other spaces shall be air conditioned or ventilated and heated in accordance with MIL-HDBK-1003/3.

9.4.2 Special Exhaust Systems. The CSD/generator room requires a separate exhaust system utilizing l00 percent outside makeup air. The battery room shall be provided with an exhaust system in accordance with NAVFAC DM-28.04, Section 5, Part 6. The ultrasonic cleaning tank in the module test and repair room shall be provided with an exhaust system, with makeup air to remove toxic fumes in accordance with MIL-HDBK-1003/3.

9.4.3 Clean Room. Mechanical requirements for the clean room shall be in accordance with MIL-HDBK-1028/5.

9.4.4 Plumbing. Plumbing shall be provided in accordance with NAVFAC DM-3.0l. An ultrasonic cleaning tank is required in the module test and repair room. The battery room shall be provided with an eyewash and deluge shower with floor drain and other plumbing requirements in accordance with NAVFAC DM-28.04, Section 5, Part 6.

9.4.5 Compressed Air and Nitrogen. Low-pressure compressed air at l25 psi (862 kPa) shall be provided in shop areas, in accordance with NAVFAC DM-3.05. Nitrogen requirements must be determined for each area. Normal supply shall be provided from regulated bottles.

9.4.6 Noise and Vibration Control. Mechanical systems and equipment shall be designed to limit noise and vibration in accordance with NAVFAC DM-3.10.

9.5 Electrical Requirements. Electrical systems shall be provided in accordance with MIL-HDBK-1004/4; NAVAIR Technical Manual 01-1A-512, Design Guide for Avionics Shop Power Distribution, and pars. 9.5.1 through 9.5.5 of this handbook.

9.5.1 Electromagnetic Interference Shielding. Utility services for the ECM room may be required to be brought into the shop by way of filters with attenuation characteristics, to prevent the radiation of intelligence data into the utility system. Requirements for electromagnetic interference shielding should be obtained from NAVAIR or the project sponsor. The shield room internal to the ECM room shall meet these same requirements for shielding. The shield room, including filters and compensators, is normally purchased as a prefabricated item. Alternating current and direct current power distribution shall be run separately to preclude interference. Electromagnetic interference shielded fixtures are required in all spaces except the ECM room, where no fluorescent lighting is permitted and incandescent lighting must be provided. Shielded enclosures shall be in accordance with NFGS-13093, Radio Frequency Shielded Enclosures, Demountable Type, or NFGS-13094, Radio Frequency Shielded Enclosures, Welded Type. Power line filters shall be provided in accordance with NFGS-16650, Radio Frequency Interference Power Line Filters.

9.5.2 Power Outlets. Power outlets shall conform to the following criteria:

a) Single-phase, l20 V, 20 ampere, 60 Hz convenience outlets shall be provided in spaces.

b) Three-phase, l20/208 V and 480 V, 60 Hz power outlets shall be provided in shops.

c) Three-phase, ll5/200 V, 400 Hz power outlets shall be provided in shops. The 400 Hz power supplies shall be regulated to eliminate error in the calibration of equipment. Refer to MIL-STD-704, Aircraft Electric Power Characteristics, and MIL-STD-1399, Section 300, Interface Standard for Shipboard Systems, Electric Power, Alternating Current, for 400 Hz power requirements. NFGS-16268 provides criteria for 400 Hz static inverter systems. The facility must provide conditioned space in the mechanical room.

d) 28 V direct current power shall be provided in shops. Refer to MIL-STD-704 for 28 V direct current power requirements.

9.5.3 Lighting. Lighting shall conform to the following criteria:

a) Interior lighting shall normally be energy efficient fluorescent, except that only incandescent lighting shall be provided in the ECM room.

b) Exterior lighting shall be high-pressure sodium vapor where practical.

c) Design for lighting intensities shall be in accordance with MIL-HDBK-1190.

9.5.4 Grounding. Two separate grounding systems shall be provided. One system is for grounding the building structure, service entrance, and normal building equipment and one for grounding instruments and avionics equipment. The latter is required in the communications, navigation, and identification (CNI); modular test and repair; electrical; fire control; and ECM spaces.

9.5.5 Communications. A communications system outlet shall be provided in the production control office for connection to the AIMD offices if the offices are located in another building (refer to par. 1.8). An intercommunications system shall be provided between production control, each shop, the ready-issue room, and the maintenance office.

9.6 Security. The entire building shall be designed for controlled access. The ECM room shall meet the requirements for a classification of SECRET, and the Crypto Repair Shop and vault shall meet the requirements for a classification of TOP SECRET in accordance with OPNAVINST 5510.1 and OPNAVINST 5530.14, Physical Security and Loss Prevention. Refer to MIL-HDBK-1013/1 for physical security construction criteria.

9.7 Weight-Handling Equipment. The monorail hoist for the remote radar test facility, when required, shall be l-ton (1 000 kg) capacity and shall have electric motorized trolley and hoist. The monorail hoist shall be operated from the floor level by pushbutton pendent controls and shall be in accordance with criteria in NAVFAC DM-38.01.

Section 10: AIRCRAFT BORESIGHT RANGE

10.1 Function. The aircraft boresight range shall be designed to provide facilities for in-place boresighting and firing in of guns built into or attached to aircraft.

10.2 Location. Two ranges, Type A (semi enclosed) and Type B (open) have different location criteria.

10.2.1 Type A Range. The Type A range shall be located in close proximity to taxiways, but special care must be taken to ensure that no visual obstruction occurs between the tower and runways and taxiways. Due to noise generation and safety considerations, this facility shall be separated from inhabited structures and the station boundary by a minimum distance of 1200 ft (366 m). Prevailing winds shall also be considered for orientation and noise abatement.

10.2.2 Type B Range. In addition to the location criteria for the Type A range, the Type B range requires a danger zone area, 1700 yards (1555 m) wide by 7000 yards (6401 m) long.

10.3 Architectural and Structural Requirements. The architectural design shall be in accordance with MIL-HDBK-1001/1, and the structural design shall be in accordance with the criteria manual series on structural engineering. Both the Type A and Type B boresight ranges shall have a length of 2000 in. (50.8 m) from the firing point of the aircraft to the target at the firing-in-butt. There shall be no structural projections in the tunnel of the Type A range, and all lighting fixtures, fixed ladders, mechanical equipment, and target maneuvering equipment shall be recessed. The Type B range, with the addition of the danger zone, shall be similar to the Type A range, except that the tunnel portion and the exhaust system shall be deleted. This would leave only the tiedown and turnaround pad, access pavements, and the firing-in-butt.

10.3.1 Tunnel. The walls and ceiling of the boresight tunnel portion shall be of l2 in. (304.8 mm) thick reinforced concrete. The entire area of the tunnel need not have a concrete floor, but shall be center paved to allow trucks and loaders to travel to the firing-in-butt for maintenance and changing of sand. Full-height, chain-link fence gates shall be provided across the tunnel entrance. The gates shall be designed so that the tunnel entrance is completely free of obstructions when the gates are open for firing.

10.3.2 Firing-in-Butt. The floor slab at the firing-in-butt portion shall be reinforced concrete with a minimum thickness of 6 in. (153 mm). In the butt area, the sidewalls, ceiling, and upper half of the rear wall shall be lined with 4 in. (102 mm) thick timber. On the Type B range, the edges of the walls and the ceiling facing the aircraft shall be faced with l2 in. (305 mm) minimum thickness timber,

fastened in such a way that there is no metal facing the firing line. Four-foot (1.2 m) square openings with watertight hatch covers shall be provided in the roof over the butt area for sandfill access.

10.3.3 Target System. The target system shall consist of a movable target easel, in which the trolley mechanism for positioning targets horizontally is recessed in the floor and the ceiling. The pulley mechanism for vertical positioning shall be recessed in the sidewalls. Adjacent to the target area, on each side of the tunnel, a fixed steel ladder shall be recessed in the wall for maintenance and target changing.

10.3.4 Wing Rooms. Rooms shall be provided on both sides of the firing-in butt target area of the Type A range only. The wing rooms shall serve as safe areas in which personnel may take refuge while sighting-in and firing occurs. The rooms shall also serve as a spare target storage area, a hook-up for direct communications to the firing line and the aircraft, and a control station for target light and ventilation equipment. The wing rooms shall have 8 in. (203 mm) thick reinforced concrete or CMU walls and an 8 in. (203 mm) thick precast or cast-in-place reinforced concrete roof. Cells of CMU walls shall be grout filled in Seismic Zones 3 and 4. Exterior openings of wing rooms shall be provided with chain-link fence gates fitted with panic hardware locks for emergency exit.

10.3.5 Shelters. Shelters shall be designed to meet the following criteria:

a) Adjacent to the tiedown and turnaround pad near the tunnel entrance, a shelter shall be provided at the electrical service points for protection and storage of electrical gear and power service cables.

b) A standard 12- by 20-ft (3.6 by 6.1 m) line shelter shall be provided near the rear portion of the tiedown and turnaround pad for crew shelters and storage of jacks and tiedown gear (refer to Section 12 for line shelter criteria).

10.3.6 Exterior Pavement. The taxiway and turnaround pad shall be designed as an aircraft parking apron for the critical using aircraft, in accordance with MIL-HDBK-1021/2 and MIL-HDBK-1021/4, except that tiedowns shall be provided on 10 ft (3.05 m) centers. Access pavements to the line shelter and the firing-in-butt shall be as called for in NAVFAC DM-5.04.

10.4 Mechanical Requirements. The mechanical requirements for the aircraft foresight range shall conform to the criteria in pars. 10.4.1. through 10.4.3.

10.4.1 Heating and Air Conditioning. Heating and air conditioning are not required for this facility.

10.4.2 Ventilation. Ventilation shall be in accordance with MIL-HDBK-1003/3. Exhaust fans shall be provided above the firing-in-butt portion of the range, to cause air to flow across the target area at the rate of 7.5 cfm (0.004 cubic meter) per square foot (0.09 square meter) of range tunnel floor area. Ventilation shall also be in accordance with Lead Exposure and Design Consideration for Indoor Firing Ranges, Thomas L. Anania and Joseph A. Seta.

10.4.3 Plumbing. Plumbing shall be provided in accordance with NAVFAC DM-3.0l and as follows:

a) Floor drains shall be provided at the tunnel entrance to remove wind-driven rain.

b) The floor trench containing the trolley mechanism shall be provided with drains to remove sprinkler system water.

c) A chemical toilet shall be provided in the line shelter unless a sanitary sewer is located nearby.

10.5 Electrical Requirements. Electrical systems shall be provided in accordance with MIL-HDBK-1004/4 and defined in pars. 10.5.1 through 10.5.4.

10.5.1 Power Outlets. Power outlets shall conform to the following:

a) Two single-phase, l20 V, 20 ampere, 60 Hz convenience outlets shall be provided in each wing room and electrical service points shelters.

b) Single-phase, l20 V, 20 ampere, 60 Hz power outlets shall be provided in the line shelter for convenience and electric heaters.

c) Three-phase, 115/200 V, 400 Hz, and 28 V direct current power outlets shall be provided in the electrical service points shelter to run the aircraft systems. Ampacity of the power outlets shall be as required by the using agency for the specific facility. Refer to MIL-STD-704 and MIL-STD-1399, Section 300, for 400 Hz power requirements and refer to MIL-STD-704 for 28 V direct current power requirements.

10.5.2 Lighting. Lighting shall conform to the following:

a) The Type A range shall be lighted to provide an intensity of 50 footcandles over the entire target face. Ceiling floodlights that light the target face shall be vertically and horizontally adjustable.

b) Lighting for the tunnel portion shall be provided at an intensity of 2 footcandles to allow safe passage in the tunnel.

c) Exterior lighting shall be in accordance with MIL-HDBK-1023/1, Airfield Lighting. Floodlights shall be provided to light the entire tiedown and turnaround pad.

10.5.3 Grounding. Two flush-ground receptacles, each with a 3/4-in. (19 mm) diameter ground rod, shall be provided in the tiedown pad. The resistance to ground shall be 25 ohms maximum. Bond ground receptacles together with No. 4 AWG bare copper in or below the tiedown pad.

10.5.4 Communications. A two-way communications system shall be provided that consists of headsets with land wiring direct between the firing-in-butt and the pilot's seat via a plug-in in the aircraft fuselage. Due to proximity of the flight line and taxiways, the headsets shall provide ear protection from medium- to high-level noise and shall consist of a noise-shielded microphone. Sound-powered phones and walkie-talkies shall not be used.

10.6 Safety Requirements. Both types of ranges shall be provided with flashing warning lights on each side of the facility, a danger flag, and a siren at the firing line to indicate firing in progress. Additionally, the Type B range and its entire danger area shall be enclosed with a chain-link fence topped with three strands of barbed wire. Gates shall be erected at the entrance and exit of station roads which cross over the danger zone. A danger flag shall be furnished and erected at each gate. Warning signs showing "Danger" and "U.S. Government Property" shall be spaced at a maximum of 500 ft (152 m) along the fence line. Refer to NAVFAC DM-5.l2, Fencing, Gates, and Guard Towers, for fencing criteria.

Section 11: AIR-LAUNCHED GUIDED MISSILE SHOP

11.1 Function. The Air-Launched Guided Missile Shop shall be designed to provide space for the receipt of such missiles as SHRIKE, SIDEWINDER, SPARROW, WALLEYE, and PHOENIX from a naval weapons station (NWS). Ready-for-issue weapons received from an NWS require only basic integrity testing at the shop. At the time of attachment to the aircraft, the "on aircraft" check and test equipment are utilized to validate the "GO" condition of the missile. Rejected units are repackaged and returned to the NWS for reprocessing. Repair of ejection racks is accomplished in the Aviation Armaments Shop.

11.2 Location. After the explosive limits for the facility have been determined, it shall be located in accordance with prescribed quantity distance standards and the provisions of NAVSEA OP-5. Site approval for explosive safety is under the cognizance of NAVFACENGCOM in accordance with NAVFACINST 11010.44, Shore Facilities Planning Manual. For ready accessibility to missile storage, the facility should be located in or near the magazine area. Direct vehicular access between the facility and the arming and de-arming pad is required.

11.3 Architectural Requirements. The Air-Launched Guided Missile Shop shall be designed as shown in the facility plates. The workbay and exterior loading area shall be equipped with a 3000 pound (1361 kg) capacity, overhead monorail system mounted 8 ft (2.4 m) above the floor. Where climatic conditions warrant, the loading area shall be covered and protected. The workbay may be finished with a chemically resistant urethane (CRU) reflective floor coating. The office and personnel area shall be finished in accordance with MIL-HDBK-l001/2, and shall include toilet and locker facilities for both male and female personnel. Physical security of the facility in terms of security fencing, perimeter lighting, and clear zones shall be as required by OPNAVINST 5530.14 and OPNAVINST 5510.1.

11.4 Mechanical Requirements. The mechanical requirements for the Air-Launched Guided Missile Shop are defined in pars. 11.4.1 through 11.4.3.

11.4.1 Heating, Ventilating, and Air Conditioning. Heating, ventilating, and air conditioning, including humidity control, shall be provided throughout the shop spaces in accordance with NAVFAC MIL-HDBK-1003/3. Inside design temperature for shop spaces shall be 78 degrees F plus 2 degrees (23.9 degrees C) with a relative humidity of 50 plus 5 percent for cooling and 65 degrees F (18.3 degrees C) for heating. Other spaces shall be air conditioned or ventilated and heated in accordance with MIL-HDBK-1003/3.

11.4.2 Compressed Air. Low-pressure compressed air shall be provided at 125 psi (862 kPa) in accordance with NAVFAC DM-3.05, with sufficient capacity to serve the monorail hoist (if an air-operated hoist is provided) and compressed air outlets for tools at the workbenches.

11.4.3 Plumbing. Plumbing shall be provided in accordance with NAVFAC DM-3.01. An eyewash and deluge shower with drain shall be provided.

11.5 Electrical Requirements. Electrical systems shall be provided in accordance with MIL-HDBK-1004/4 and as defined in pars. 11.5.1 through 11.5.3.

11.5.1 Lighting. Lighting shall conform to the following criteria:

a) Interior lighting shall be energy efficient fluorescent.

b) Task lighting in the work area shall be 70 footcandles at 3 ft (0.9 m) above the floor.

c) General lighting intensities shall be in accordance with MIL-HDBK-1190.

d) Fixed emergency work lighting shall be provided to permit completion of assembly of a missile during power outages.

e) Exterior lighting shall be of the high-pressure sodium vapor type where practical.

11.5.2 Grounding. An automatic retracting ground reel shall be provided in each work area.

11.5.3 Lightning Protection. Lightning protection shall be provided in accordance with NAVSEA OP-5 requirements.

11.6 Security. The entire building shall be designed for controlled access and shall meet the requirements of OPNAVINST 5510.1, OPNAVINST 5530.14, and MIL-HDBK-1013/1.

11.7 Weight-Handling Equipment. The overhead monorail hoist shall have a 3000 pound (1361 kg) capacity with either an air-operated (in accordance with NFGS-14535, Monorails With Air Motor Powered Hoist), or a sparkproof electric hoist and trolley motors. The hoist shall be a wire rope type. Chain hoists shall not be used, due to the possibility of the chain damaging missile components (refer to NAVFAC DM-38.01 for additional criteria).

Section 12: LINE SHELTER

12.1 Function. The line shelter is provided to support aircraft line operations and maintenance and may be used to support other functions that require a portable or permanent building. The shelter configured for line operations contains space for crew shelter and support facilities, and the shelter configured for line maintenance contains space for tiedown gear, preexpended material, and sheltered work space. Shelters provided for other purposes shall be configured as required.

12.2 Location. Line shelters shall be located as close as possible to the working area of the personnel and aircraft they support.

12.3 Architectural Requirements. The architectural requirements for line shelters are defined in pars. 12.3.1 through 12.3.4.

12.3.1 Portable Line Shelters. The portable line shelter is a skid-mounted building of non-combustible material, with outside dimensions of l2 by 20 ft (3.66 by 6.1 m) and an interior floor-to-ceiling height of 8 ft (2.44 m). The shelter shall not weigh more than l8,000 pounds (8165 kg) and shall have the capability of being lifted as a unit. Integral lift points shall be provided. Each building envelope shall be insulated as required in par. 1.6. Each portable line shelter shall be a pre-engineered panel frame metal building. Built-in bins, counters, and equipment (except lockers) shall be provided as shown in the facility plates.

12.3.2 Permanent Line Shelters. The permanent line shelter shall be an insulated pre-engineered metal building or of insulated CMU construction. Each permanent shelter shall contain offices; storage; repair shop; and toilet, locker, and shower facilities for male and female personnel.

12.3.3 Noise Control. Due to their proximity to the flight line and apron, adequate acoustical insulation shall be provided in each type of shelter to meet office requirements as set forth in NAVFAC DM-1.03.

12.3.4 Interior Finishes. Interior surfaces, including walls, floors, and ceilings shall have easily maintained and cleaned finishes.

12.4 Mechanical Requirements. The mechanical requirements for line shelters are defined in pars. 12.4.1 and 12.4.2.

12.4.1 Portable Shelter. An electric, ceiling-mounted, variable-throw, forced-air space heater and a ventilating fan shall be provided as required in accordance with MIL-HDBK-1003/3. A dry chemical toilet shall also be provided.

12.4.2 Permanent Shelter. Heating and ventilation shall be provided in accordance with NAVFAC MIL-HDBK-1003/3. Plumbing shall be provided in accordance with NAVFAC DM-3.01.

12.5 Electrical Requirements. The electrical requirements for line shelters are defined in pars. 12.5.1 and 12.5.2.

12.5.1 Portable Shelter. A weatherproof, exterior, power receptacle shall be provided for a plug-in, single-phase, 120 V, 60 Hz source from an apron service point or a portable generator. Two 20 ampere capacity convenience outlets shall be provided on each wall. Ceiling, surface-mounted, electrical lighting fixtures shall be provided for a minimum of 30 footcandles of light intensity at counter height.

12.5.2 Permanent Shelter. Electrical systems shall be provided in accordance with MIL-HDBK-1004/4.

12.6 Communications. If practical, landline communications shall be provided with the organizational hangar and communications tie-in. If not practical, provide for communications by two-way radio on designated frequencies (refer to par. 1.8). Communications to the flight line apron shall be by loudspeaker.

Section 13: FLAMMABLE STORAGE FACILITIES ON THE FLIGHT LINE

13.1 Function. A flammable storage facility on the flight line shall be provided for storage of paints, oils, cleaners, solvents, and other flammable or combustible materials being used in the hangars and aircraft maintenance shops, where adequate inside fire-resistive storage has not been provided.

13.2 Location. A flammable storage facility may be located adjacent to or in the vicinity of the hangar or shop that it supports.

13.3 Architectural Requirements. A flammable storage building located less than 50 ft (15.2 m) from an adjacent building shall not have any opening in the wall facing the adjacent building. Any drainage from the flammable storage facilities shall be away from the adjacent building. The building shall be of metal panel construction. The floor and lower portion of the building walls shall be liquid tight. Door openings shall have liquid-tight raised sills or ramps at least 4 in. (102 mm) high. Ventilation openings shall be located as low as feasible above sill height in doors and walls. Shelves 8 in. wide (203 mm) shall be provided. Refer to NAVFAC P-272, Part 3, for a 450 square foot (41.8 square meter) ground support equipment shop, flammable storage facility, and for a l50 square foot (13.9 square meter) facility for a Marine Corps aircraft squadron.

13.4 Mechanical Requirements. Gravity exhaust ventilation shall be provided in accordance with the requirements set forth in MIL-HDBK-1003/3.

13.5 Electrical Requirements. Electrical installations shall be in accordance with NAVFAC DM-22, Petroleum Fuel Facilities, and NFPA 70.

Section 14: MARINE CORPS AIRCRAFT MAINTENANCE FACILITIES

14.1 Function. Marine Corps aircraft maintenance facilities encompass the functions of aircraft maintenance facilities for the Navy. However, Marine Corps facilities differ from Navy facilities as described in pars. 14.1.1 and 14.1.2

14.1.1 Maintenance Responsibilities. A Marine Corps air station may be assigned only limited intermediate maintenance level responsibility for its own aircraft. Intermediate level maintenance for Marine Corps aircraft squadrons is performed by a headquarters and maintenance squadron (H&MS). At a naval station, this maintenance is performed by an AIMD for aircraft based at the station. In a garrison situation, a Marine Corps aircraft group may be responsible for maintenance for as many as six or more squadrons.

14.1.2 Maintenance Facilities. The expeditionary nature of the Marine Corps air support mission requires that some aviation maintenance support equipment be configured for MFs which deploy with the group. Since it is not practical or economical to remove installed equipment from MFs or to duplicate this equipment in permanent facilities, Marine Corps aircraft maintenance in the continental United States must be a combination of permanent construction and the MF. Navy aircraft maintenance facilities, however, are usually permanent construction.

14.2 Location. Each Marine Corps intermediate level maintenance shop complex should be located in proximity to the air group hangars. Preferably, the shops should be located to the rear of the line of hangars as depicted in NAVFAC P-272, Part 3. The definitive drawing shows a hangar and shop complex for a typical Marine Corps air group.

14.3 Design Requirements. The design criteria contained in other sections of this handbook for maintenance hangars and intermediate level maintenance shops shall apply to the maintenance hangars and intermediate level maintenance spaces and shops supporting a Marine Corps air group, except as modified herein. Refer to NAVFAC P-80 for adjustments in size requirements for permanent Marine Corps facilities.

14.4 Architectural and Civil Requirements. Where facilities are to house deployable personnel units, the floor plan and exterior perimeter walls of the permanent structure shall be arranged to permit installation of one or more MFs. Provisions shall be made to connect such MFs to the permanent work spaces with direct and level access. Standard MFs are planned to be 8 ft (2.44 m) wide, 20 ft (6.1 m) long, and 8 ft (2.44 m) high. The average distance from the floor surface of the MF bed to the bottom of jacks is 30 in. (762 m). Two MFs may be placed close together side-by-side; however, a minimum distance of l0 ft (3.05 m) must be left between pairs of MFs for MF placement, removal, and servicing. Some MF complexes require

end-to-end connections between MFs arranged in combinations up to four deep. The apron around the building where the MF will be located shall be concrete pavement, in accordance with NAVFAC DM-5.04. The concrete apron shall be wide enough to accommodate four MFs end-to-end. Additional aprons shall be provided as necessary for convenient parking of MFs and access around the MF complex (refer to the manufacturer's manual covering the MF that will be utilized). Access from the building to the MF shall be through watertight, weatherproof vestibules, closeable by fusible-link, actuated, rolling steel fire doors. These vestibules shall be deep enough so that the doors of the initial MF are operable and do not interfere with the fire doors. Where MFs line exterior walls of the building, a personnel door shall be provided to the exterior between every fourth MF series. Refer to NAVFAC P-272, Part 3, for definitive drawings showing shops configured for MF. Space shall be provided near the facility for parking MF trailers, and enclosures shall be provided for equipment required to service the MF.

14.5 Security. Depending upon the nature of the facility, consideration shall be given to providing security fencing and lighting of the complex's perimeter and apron area. Refer to MIL-HDBK-1013/1 and MIL-HDBK-1013/11, Instruction for High Security Magazine Door Construction, for physical security and fencing requirements.

14.6 Mechanical Requirements. Mechanical design for the permanent portion of the facility shall be as required by other sections in this handbook covering a similar type of facility not utilizing MFs (refer to Sections 5, 7, 8, 9, 10, and l5).

14.7 Electrical Requirements. Electrical design for the permanent portion of the facility shall be as required by other sections in this handbook covering a similar type of facility not utilizing MF (refer to Sections 5, 7, 8, 9, l0, and l5). Additional requirements are defined in pars. 14.7.1 through 14.7.4.

14.7.1 Emergency Power. A power outlet shall be provided on the outside of the permanent building structure for connection of an emergency, field-type generating unit to the building power loop. The power outlet shall be of a capacity to handle the entire facility electrical power requirement and shall be connected to the power system through a manual transfer switch. The transfer switch will permit operating the generating unit during the loss of the normal power source and will permit load testing of the unit.

14.7.2 400 Hertz Power. For facilities that require 400 Hz power (refer to Sections 5, 8, and 10), a permanent source of 400 Hz power shall be provided for the facility, even though a portable unit is used for the MF complex, so that this power will be available at the permanent facility when the portable unit is deployed. Voltage

regulation shall be provided when required by the work performed in some MFs. Energy efficient solid-state frequency converters shall be used. NFGS-16268 provides specifications.

14.7.3 Power Outlets. Power outlets shall be provided on the outside of the building at each opening for MF. The voltage and phase of the outlets shall be as required by the particular facility and the ampacity shall be sufficient to supply four MFs end-to-end. Outlets shall be adaptable to the plugs provided with the MF in accordance with Military Specification (MIL)-C-22992, Connector, Plugs and Receptacles, Electrical, Waterproof, Quick Disconnect, Heavy Duty Type.

14.7.4 Communications. A plug-in intercommunications system between the production control office and each series of MFs shall be provided at the building perimeter.

Section 15: MARINE CORPS AIRCRAFT GROUP AVIATION SUPPLY SUPPORT CENTER

15.1 Function. A Marine Corps Aircraft Group Aviation Supply Support Center (GASSC) provides administrative, material handling, and storage spaces for Marine Corps aircraft group supply functions and the handling and storage of Navy and Marine Corps material and property assigned to the group.

15.2 Location. The GASSC building and the open storage area shall be located within the intermediate level maintenance shop complex in proximity to the Marine Corps aircraft group hangars. Consideration shall be given to placement of MF adjacent to the building and to unobstructed access from each maintenance shop and base supply. The preferred location of the GASSC administrative bay is adjacent to the Marine Corps Aircraft Group Headquarters Building (refer to NAVFAC P-272, Part 3).

15.3 Architectural Requirements. The GASSC shall be a pre-engineered insulated metal building. Rooms and areas shall be provided as depicted in NAVFAC P-272, Part 3, and as defined in pars. 15.3.1 through 15.3.3.

15.3.1 Spaces. Space within the GASSC shall conform to the criteria in pars. 15.3.1.1 through 15.3.1.4.

15.3.1.1 Administrative. Administrative spaces shall be subdivided with movable partitions and shall contain provisions for convenient location of office machines.

15.3.1.2 Security Area. A security area, a pre-expended bin storage room, and a small flammable storage room shall be constructed of solid CMUs of 8-in. (203 mm) minimum thickness. Refer to NFPA 30, Flammable and Combustible Liquids Code, for construction criteria for flammable storage.

15.3.1.3 Receiving and Issue and Supply. Receiving and issue and supply screening functions shall be located in the vicinity of the building entrance and enclosed by 4 ft high (minimum) movable partitions that offer optimum surveillance of entrances.

15.3.1.4 Interior Storage. Interior storage areas shall be subdivided by full-height, chain-link fencing.

15.3.2 Building Access. Access to the GASSC shall be as follows:

a) Provide for permanent controlled access from the building to small parts MF. Refer to Section 14 for criteria covering Marine Corps aircraft maintenance facilities.

b) Access to the building from the loading dock and ramp shall be by rollup doors.

15.3.3 Building Protection. Interior columns and partitions shall be protected against impact by materials handling equipment.

15.4 Mechanical Requirements. The GASSC shall conform to the criteria defined in pars. 15.4.1 through 15.4.4.

15.4.1 Heating and Ventilation. Heating and ventilation shall be provided in the administrative, material handling, and storage spaces in accordance with MIL-HDBK-1003/3.

15.4.2 Air Conditioning. Air conditioning shall be provided for the administrative spaces in accordance with MIL-HDBK-1003/3.

15.4.3 Plumbing. Plumbing shall be in accordance with NAVFAC DM-3.01.

15.4.4 Noise and Vibration Control. Mechanical systems and equipment shall be designed to limit noise and vibration in accordance with NAVFAC DM-3.10.

15.5 Electrical Requirements. Electrical systems shall be provided in accordance with MIL-HDBK-1004/4 and pars. 15.5.1 through 15.5.3.

15.5.1 Power Outlets. Single-phase, l20 V, 20 ampere, 60 Hz convenience outlets shall be provided in all spaces.

15.5.2 Lighting. Lighting shall conform to the following:

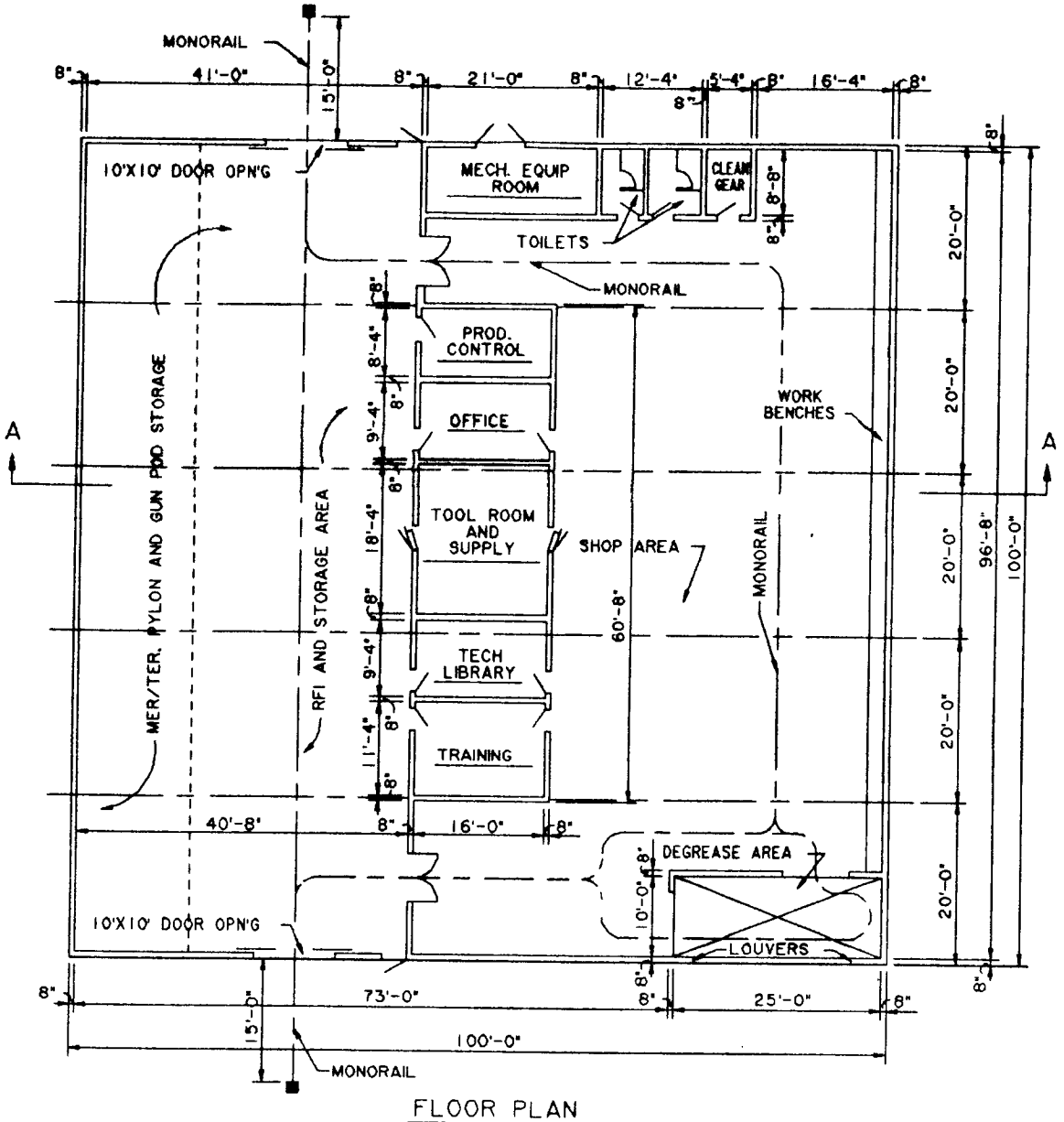
a) Interior lighting shall normally be energy efficient fluorescent.

b) Exterior lighting shall be high-pressure sodium vapor where practical.

c) Design lighting intensities shall be in accordance with MIL-HDBK-1190.

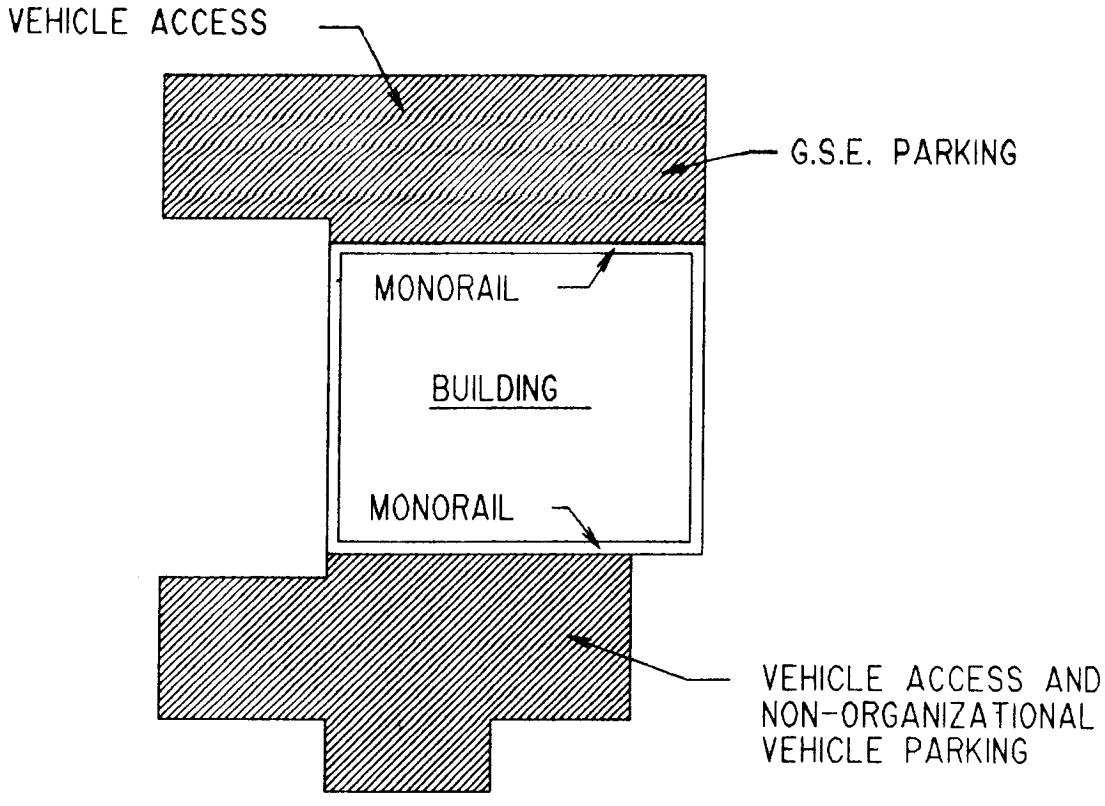
15.5.3 Communications. Internal communications shall be provided.

NOTE: MONORAIL 2000 LB. CAP



FLOOR PLAN
NOT TO SCALE

TITLE: AVIATION ARMAMENT SHOP	DATE 03/91	FACILITY PLATE NO. 211-54	SHEET 1 OF 3



TYPICAL SITE PLAN

NOT TO SCALE

TITLE: AVIATION ARMAMENT SHOP	DATE 03/91	FACILITY PLATE NO. 211-54	SHEET 2 OF 3

NOTES

PLUMBING REQUIREMENTS

COLD WATER	50 G.P.M.
HOT WATER	
RECOVERY RATE (100°RISE)	30 G.P.H.
STORAGE	30 GAL.

FIRE PROTECTION REQUIREMENTS NOT INCLUDED

HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE

-5°F	+5°F	+15°F	+25°F
294	252	210	168

AIR CONDITIONING REQUIREMENTS

BASED ON 91°F D.B. 76°F WB OUTSIDE DESIGN CONDITIONS

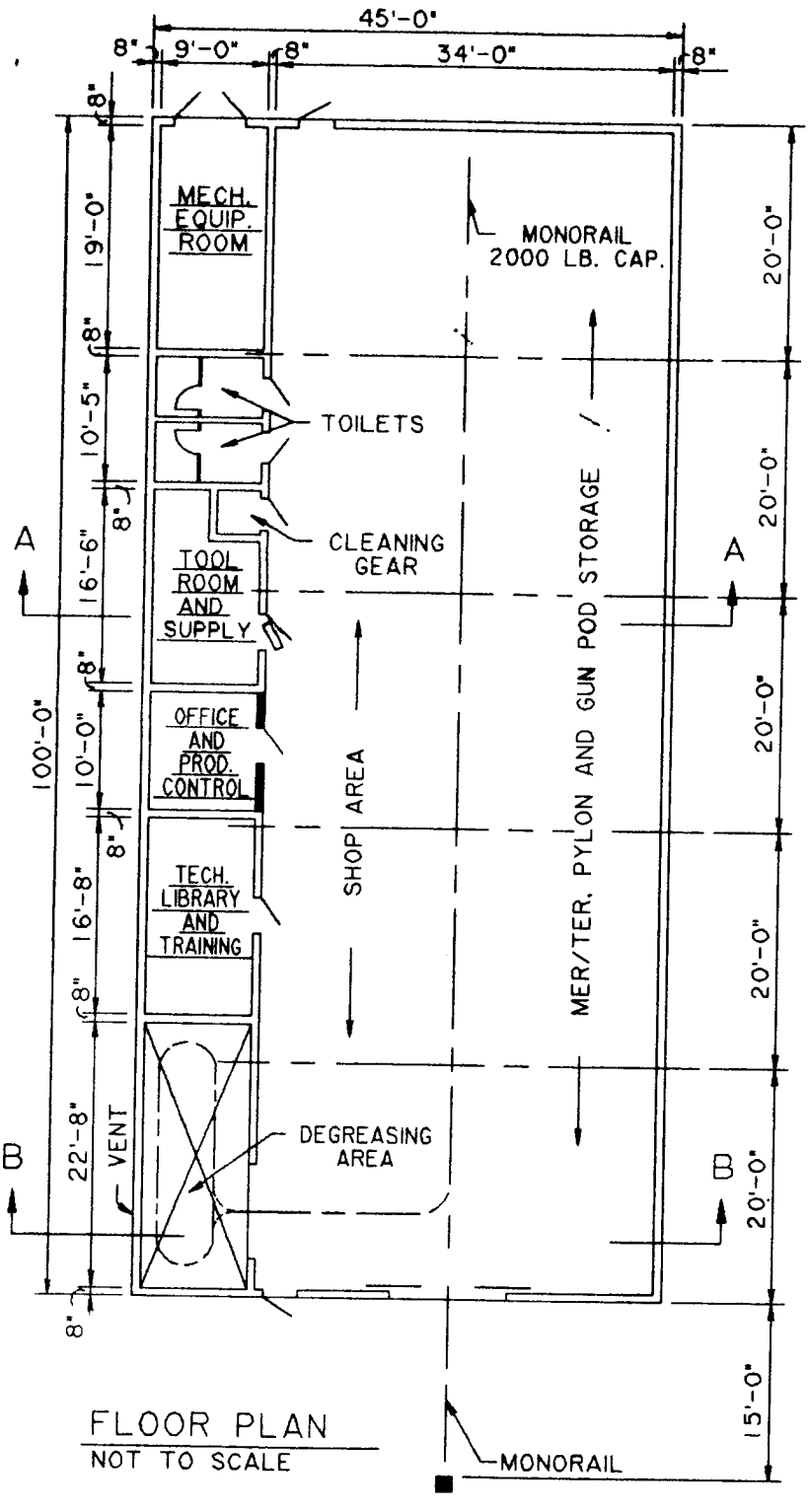
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	18.4
ESTIMATED DEMAND	14.2
POWER	
CONNECTED LOAD	120.0
ESTIMATED DEMAND	96.0
TOTAL	
CONNECTED LOAD	138.4
ESTIMATED DEMAND	110.2
AIR CONDITIONING	TO BE DETERMINED

AREAS

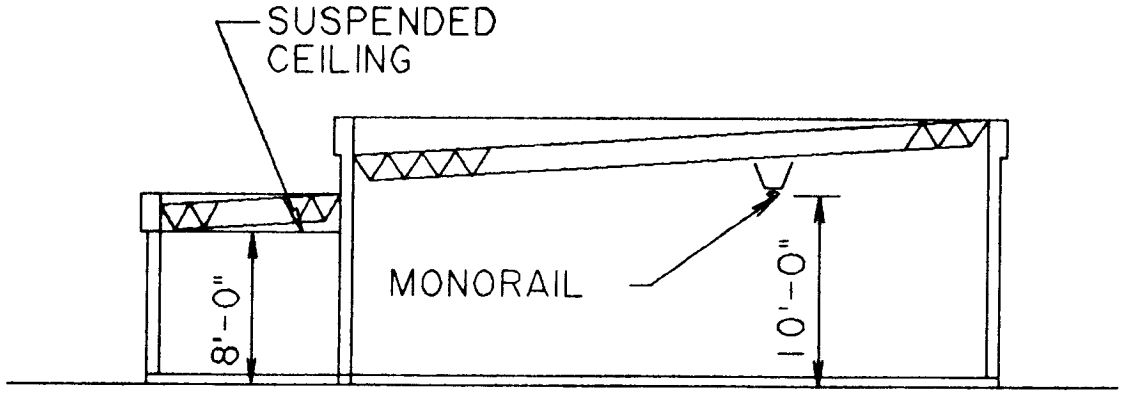
GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM 10,000 S.F.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIATION ARMAMENT SHOP	03/91	211-54	3 OF 3

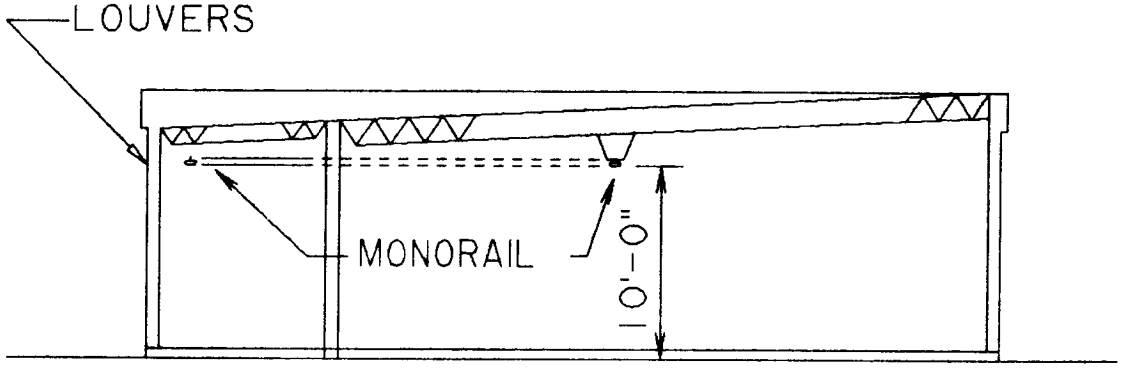


FLOOR PLAN
NOT TO SCALE

TITLE: AVIATION ARMAMENT SHOP	DATE 03/91	FACILITY PLATE NO. 211-54	SHEET 1 OF 4

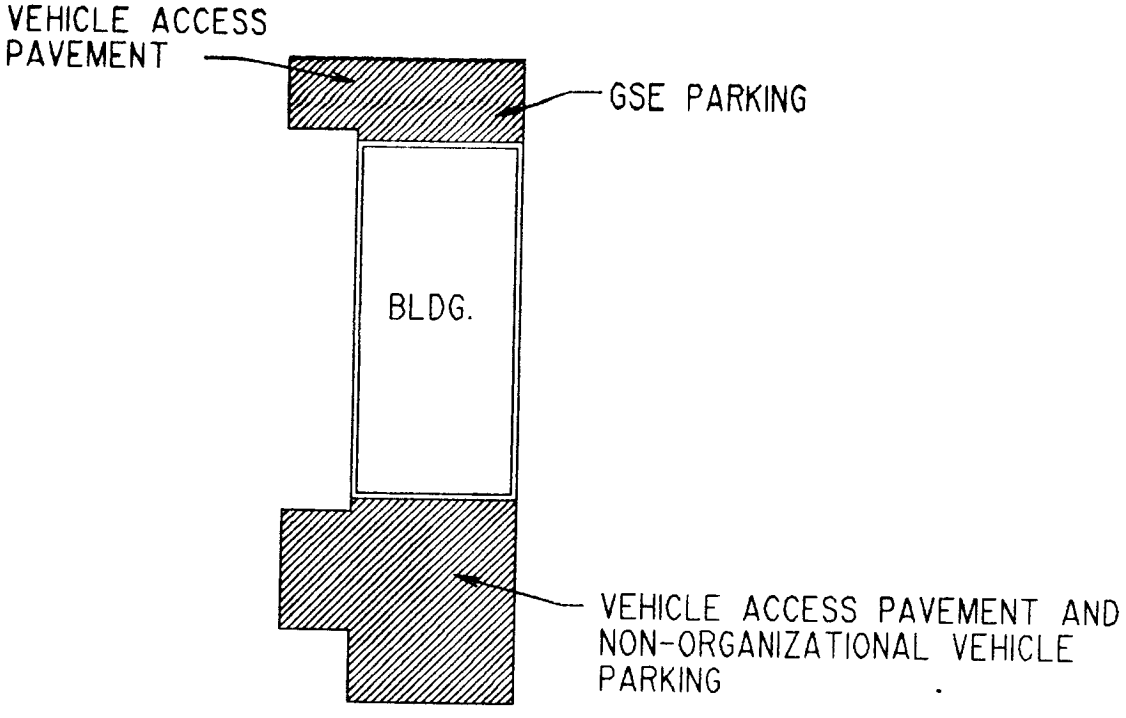


SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

TITLE: AVIATION ARMAMENT SHOP	DATE 03/91	FACILITY PLATE NO. 211-54	SHEET 2 OF 4



TYPICAL SITE PLAN

NOT TO SCALE

TITLE: AVIATION ARMAMENT SHOP	DATE 03/91	FACILITY PLATE NO. 211-54	SHEET 3 OF 4

NOTES

PLUMBING REQUIREMENTS

COLD WATER	50 G.P.M.
HOT WATER	
RECOVERY RATE (100° RISE)	30 G.P.H.
STORAGE	30 GAL.

FIRE PROTECTION REQUIREMENTS NOT INCLUDED

HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE

-5°F	+5°F	+15°F	+25°F
210	180	150	120

AIR CONDITIONING REQUIREMENTS

BASED ON 91°F D.B. 76°F WB OUTSIDE DESIGN CONDITIONS

COOLING LOAD (MBTU/HR)

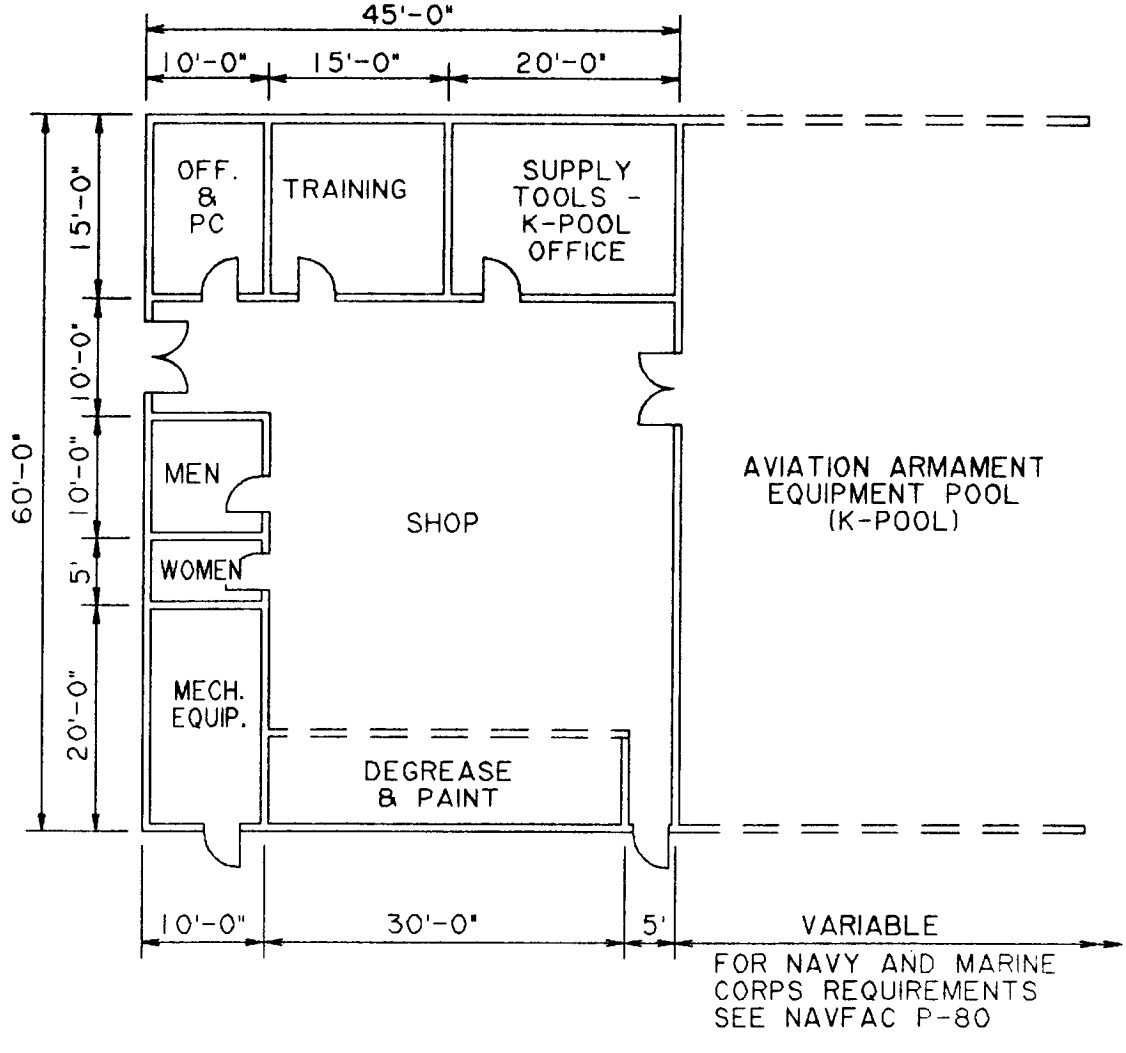
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	16.2
ESTIMATED DEMAND	12.6
POWER	
CONNECTED LOAD	18.0
ESTIMATED DEMAND	14.4
TOTAL	
CONNECTED LOAD	34.2
ESTIMATED DEMAND	27.0
AIR CONDITIONING	TO BE DETERMINED

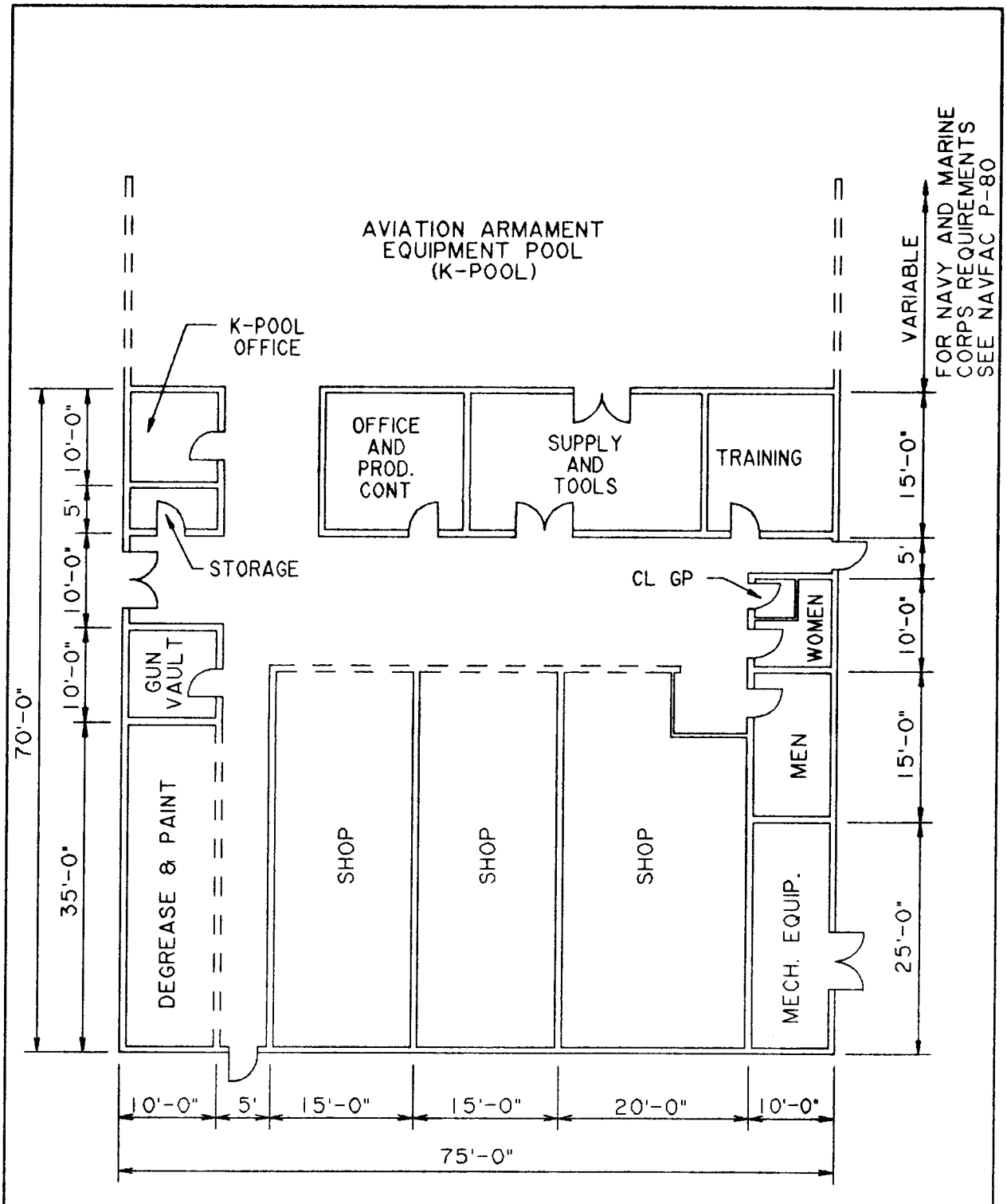
AREAS

GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM	4,500 S.F.

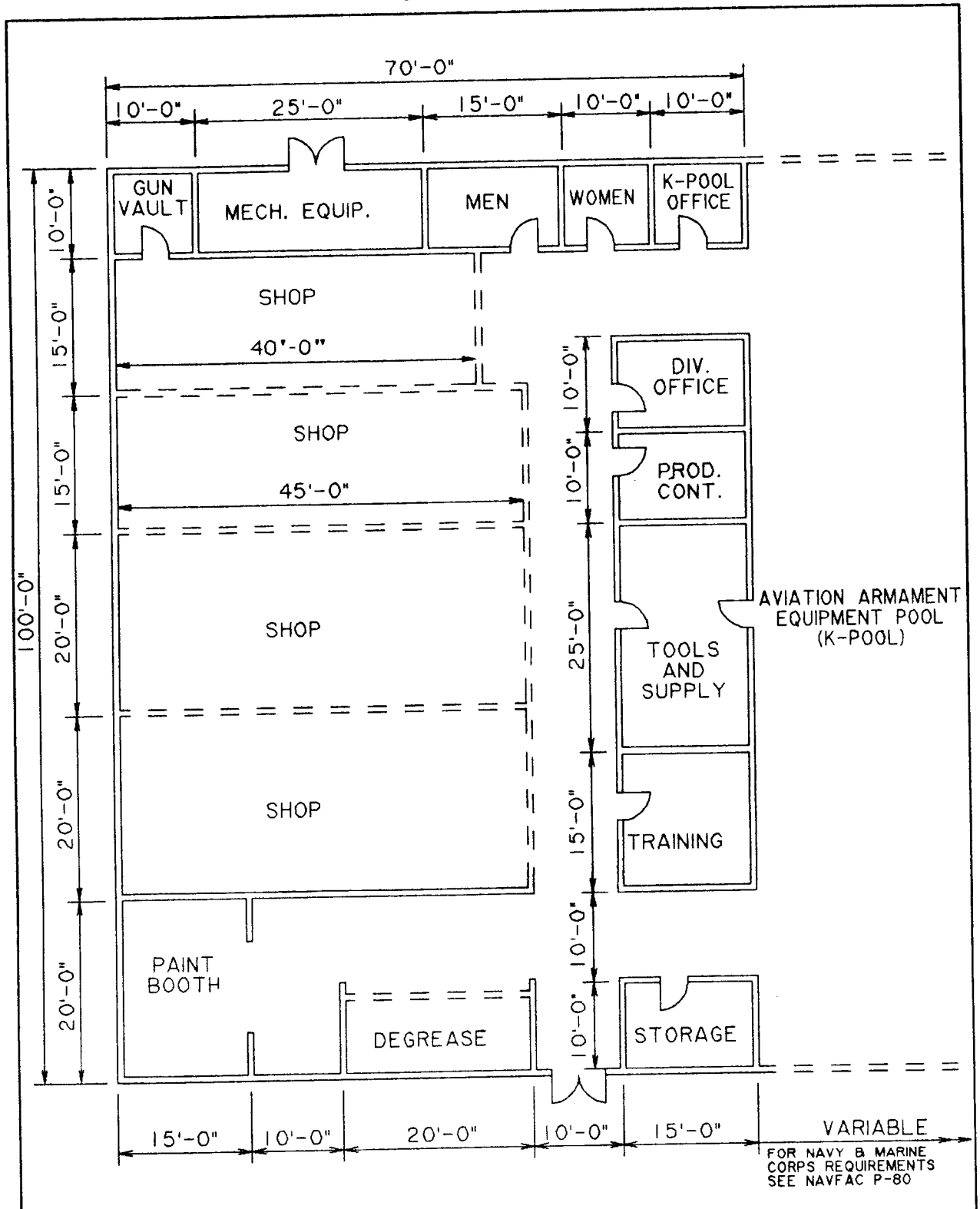
TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIATION ARMAMENT SHOP	03/91	211-54	4 OF 4



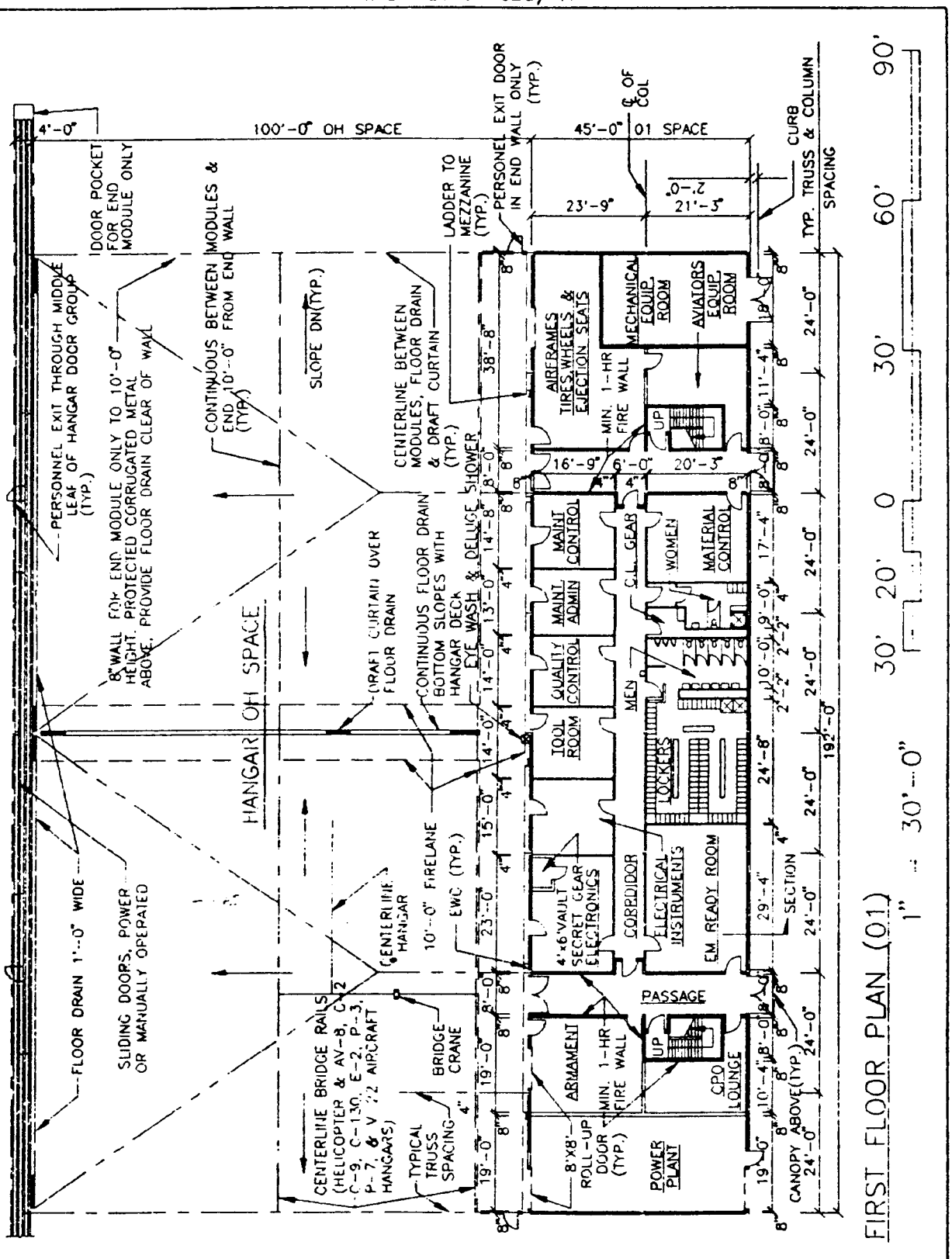
TITLE: AVIATION ARMAMENT SHOP - SMALL	DATE 03/91	FACILITY PLATE NO. 211-54	SHEET 1 OF 1



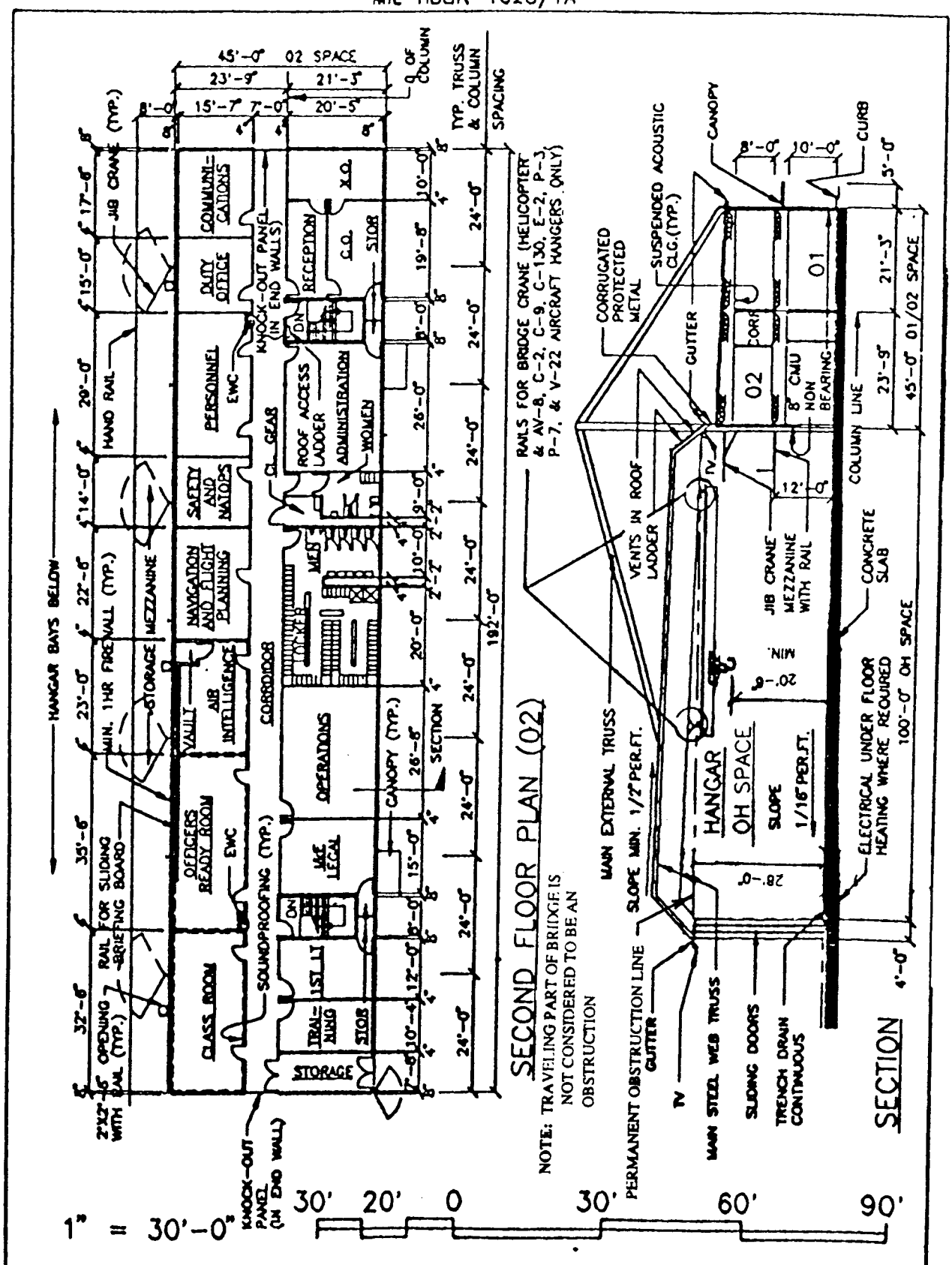
TITLE: AVIATION ARMAMENT SHOP - MEDIUM	DATE 03/91	FACILITY PLATE NO. 211-54	SHEET 1 OF 1



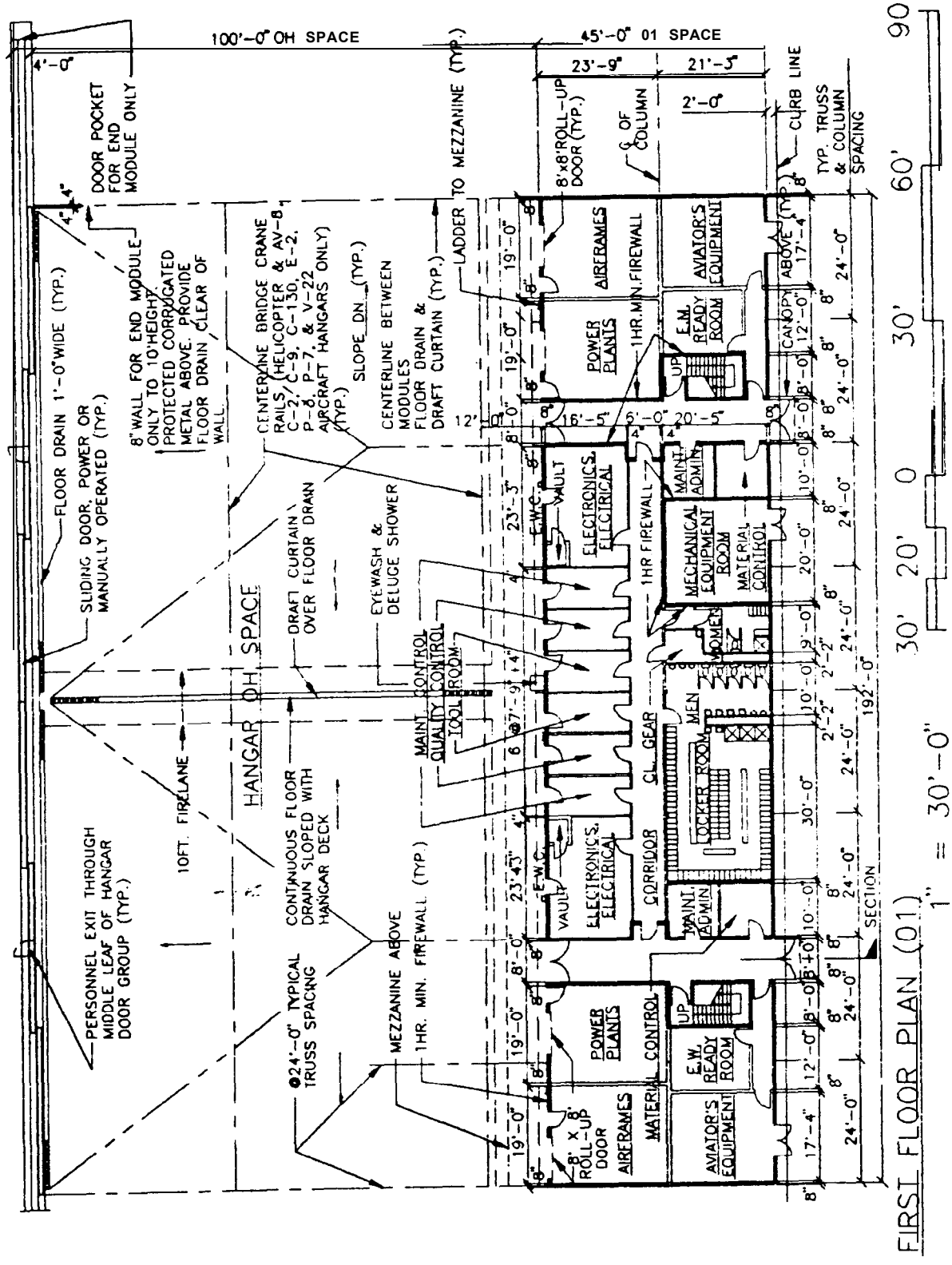
TITLE: AVIATION ARMAMENT SHOP - LARGE	DATE 03/91	FACILITY PLATE NO. 211-54	SHEET 1 OF 1



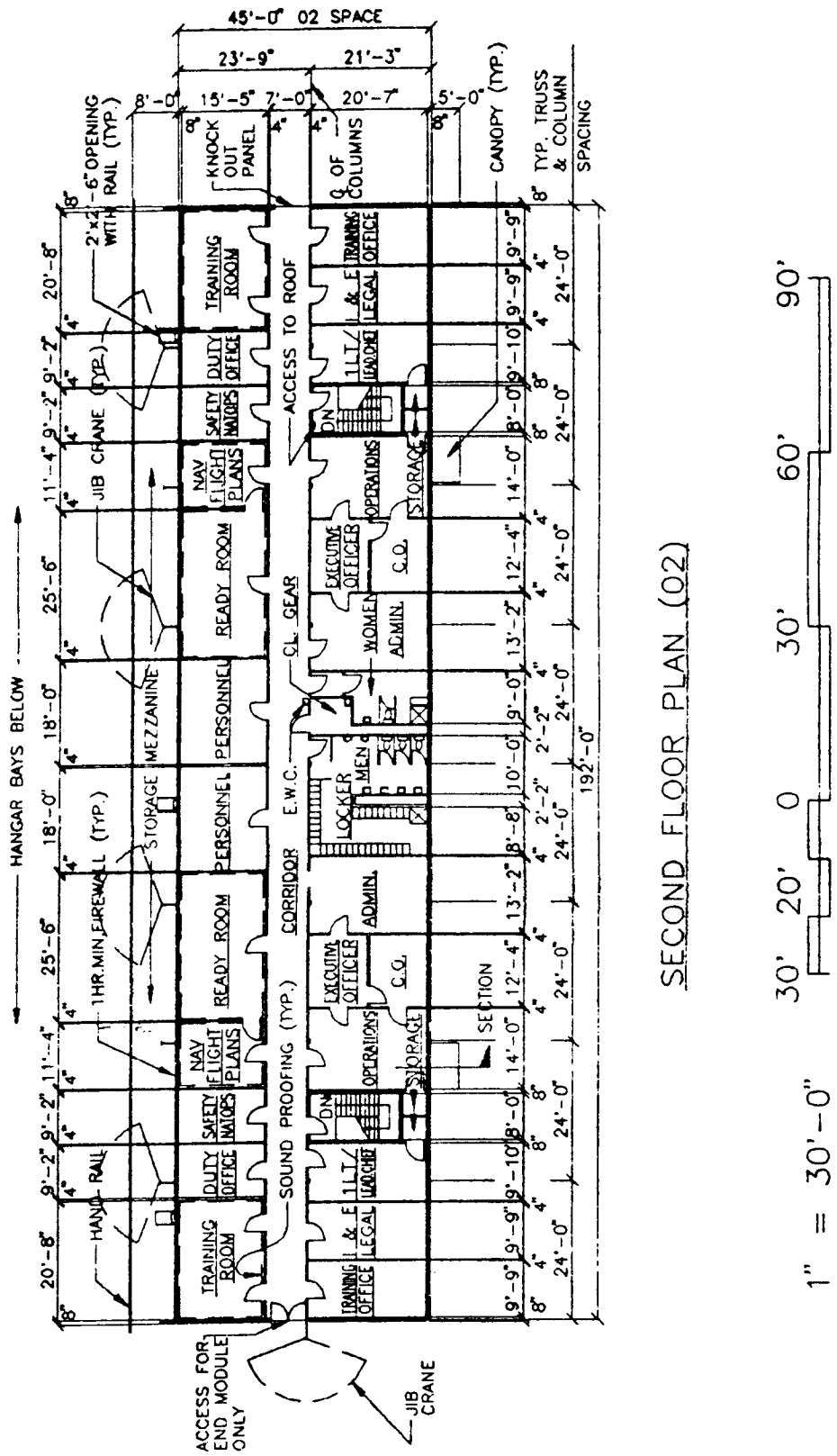
TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE I	03/91	211-05/06/07	1 of 9



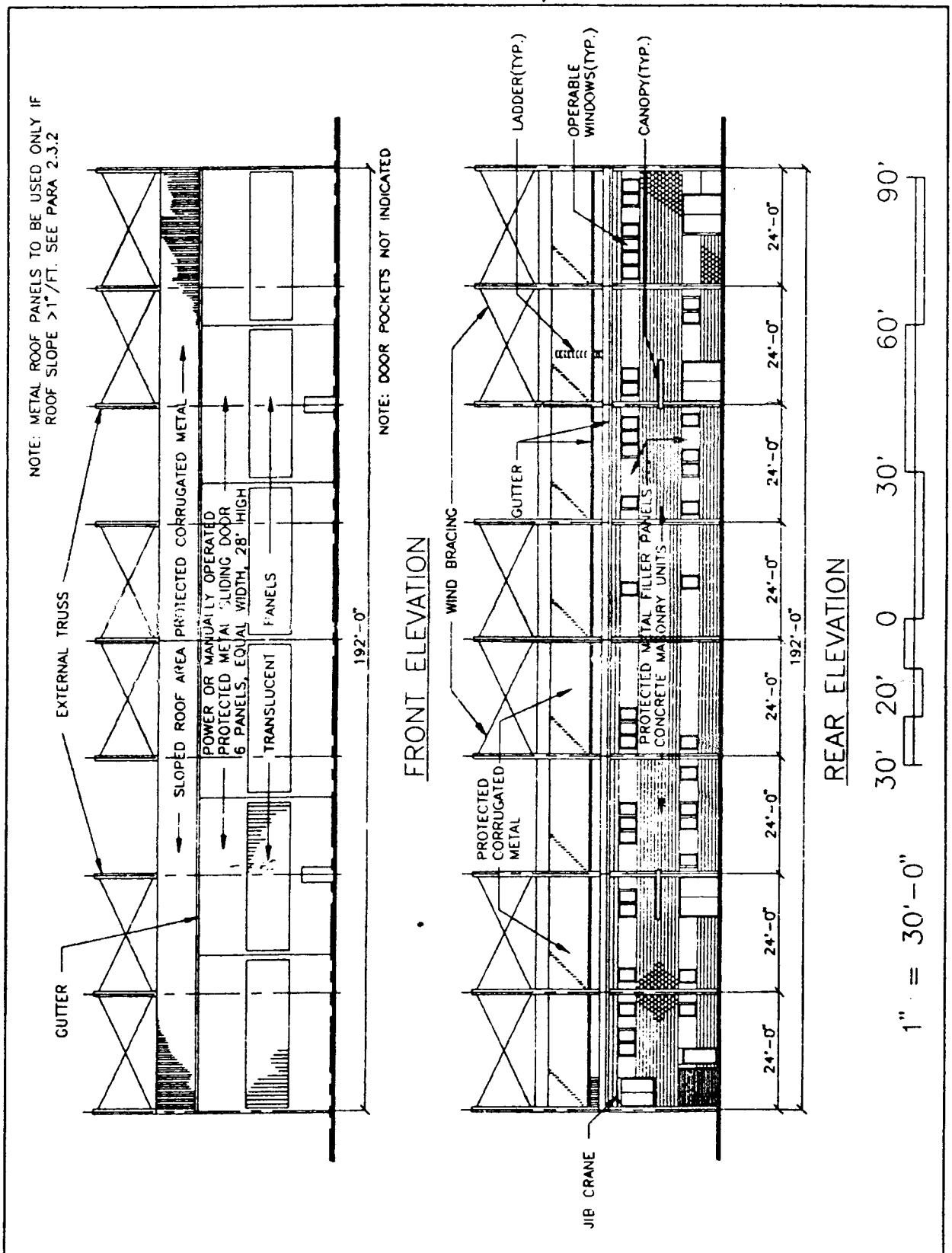
TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE I	03/91	211-05/06/07	2 of 9



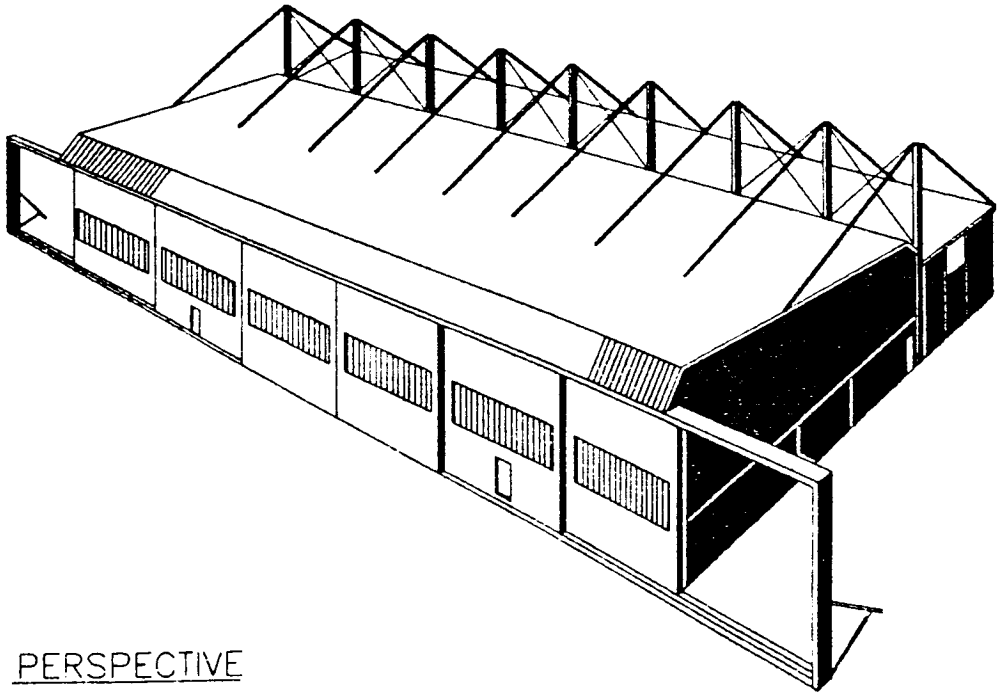
ITLE: MAINTENANCE HANGAR TYPE1, CONFIGURED FOR TWO CARRIER AEW SQUADRONS	DATE	FACILITY PLATE NO.	SHEET
	03/91	211-05/06/07	3 of 9



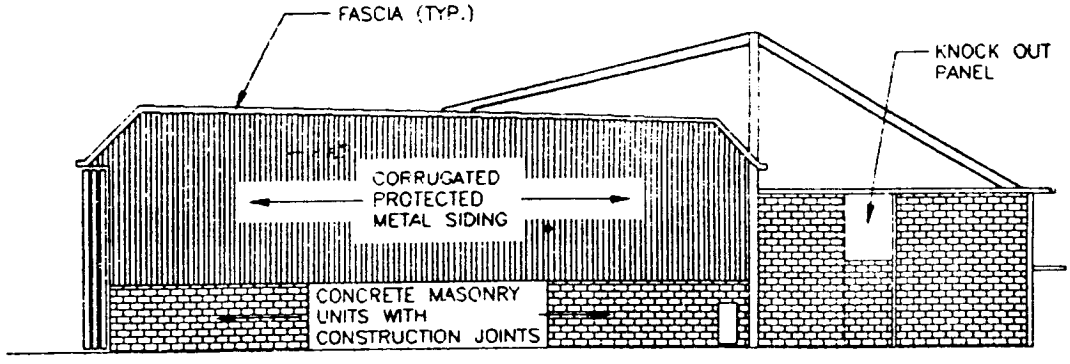
TITLE: MAINTENANCE HANGAR TYPE I, CONFIGURED FOR TWO CARRIER AEW SQUADRONS	DATE	FACILITY PLATE NO.	SHEET
	03/91	211-05/06/07	4 of 9



TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE I	03/91	211-05/06/07	5 of 9



PERSPECTIVE

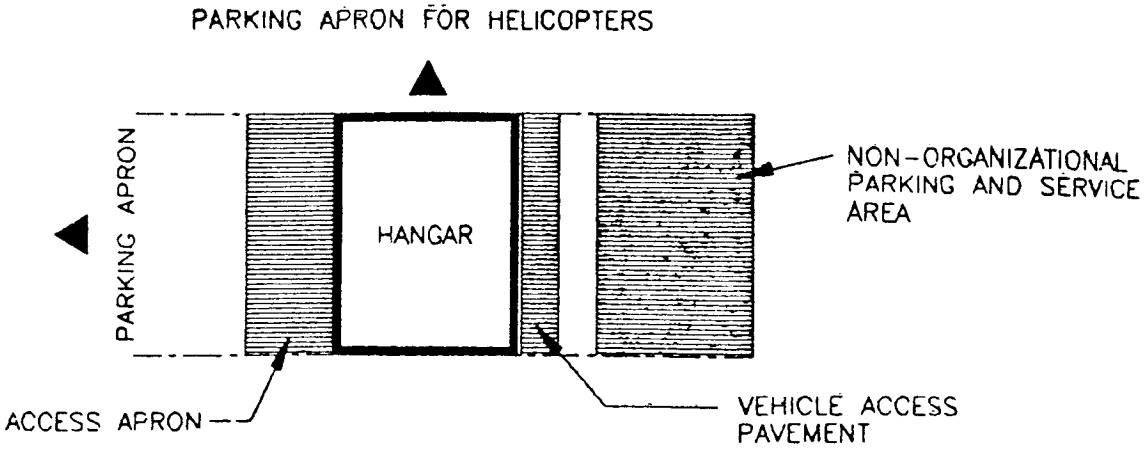


SIDE ELEVATION

1" = 30'-0"

30' 20' 0 30' 60' 90'

TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE I	03/91	211-05/06/07	6 of 9



TYPICAL SITE PLAN
SCALE : NONE

THE ARRANGEMENT AND FUNCTIONAL LAYOUT INDICATED SHALL BE FOLLOWED UNLESS PRIOR CLEARANCE FOR CHANGE IS OBTAINED FROM THE NAVAL FACILITIES ENGINEERING COMMAND.

THE ARCHITECTURAL TREATMENT, MATERIALS, FRAMING AND CONSTRUCTION MAY VARY.

UTILITIES REQUIREMENTS INDICATED ARE FOR ESTIMATING PURPOSES ONLY.

GENERAL NOTES:

* IF THE NUMBER OF WOMEN TO BE ASSIGNED IS UNKNOWN, PROVIDE AS A MINIMUM THE TOILET FACILITIES INDICATED ON THE DRAWING.
* FOAM CONCENTRATE TANKS PROPORTIONING EQUIPMENT, FIRE PUMPS AND SPRINKLER VALVES SHALL BE LOCATED IN THE MECHANICAL EQUIPMENT ROOM.
* THE DIMENSIONS OF THE OH SPACE SHOULD BE MODIFIED AS APPROPRIATE TO ACCOMMODATE OVER-SIZE AIRCRAFT SUCH AS THE CH-53E AND THE E-2C.
* MINIMUM CEILING HEIGHT INDICATED IN OH SPACE.
* HOOK HEIGHT FOR BRIDGE CRANE(IF REQUIRED) SHOULD BE A MINIMUM OF 20'-6" ABOVE FINISHED FLOOR.

TITLE: MAINTENANCE HANGAR TYPE I	DATE 03/91	FACILITY PLATE NO. 211-05/06/07	SHEET 7 of 9

PLUMBING REQUIREMENTS

COLD WATER	90 G.P.M.
HOT WATER	01/02 SPACE
RECOVERY RATE (THRU 100°F RISE)	350 G.P.H.
STORAGE	400 GAL.

FIRE PROTECTION REQUIREMENTS

WATER DEMAND	
FOAM-WATER SPRINKLER SYSTEM	3195 G.P.M.
OSCILLATING NOZZLES	1000 G.P.M.
HOSE STREAMS	500 G.P.M.
TOTAL FIRE PROTECTION DEMAND	4695 G.P.M.

HEATING REQUIREMENTS *

* BASED ON NORFOLK, VIRGINIA AREA

INSIDE DESIGN TEMPERATURE	
OH SPACE	60°F.
01/02 SPACE	68°F
OUTSIDE DESIGN TEMPERATURE	22°F
HEATING LOAD	
OH SPACE	975,000 BTU/HR
01/02 SPACE	215,000 BTU/HR

AIR CONDITIONING REQUIREMENTS *

INSIDE DESIGN TEMPERATURE	76°F.D.B.
INSIDE DESIGN HUMIDITY	50 %
OUTSIDE DESIGN TEMPERATURE	91°F.D.B.
OUTSIDE DESIGN TEMPERATURE	77°F.W.B.
COOLING LOAD, 01/02 SPACES	453,000 BTU/HR

EXCLUDING MECH RM, PASSAGES, STAIRS, TOILETS, POWER PLANTS, AVIATORS EQ. & AIR FRAMES

ELECTRICAL REQUIREMENTS (KW)

	OH SPACE	01/02 SPACE
LIGHTS		
CONNECTED LOAD	38	61
ESTIMATED DEMAND	38	61
POWER		
CONNECTED LOAD	837	208
ESTIMATED DEMAND	419	104
TOTAL		
CONNECTED LOAD	875	269
ESTIMATED DEMAND	457	165

ADDITIONAL DEMAND FOR AIR CONDITIONING 54

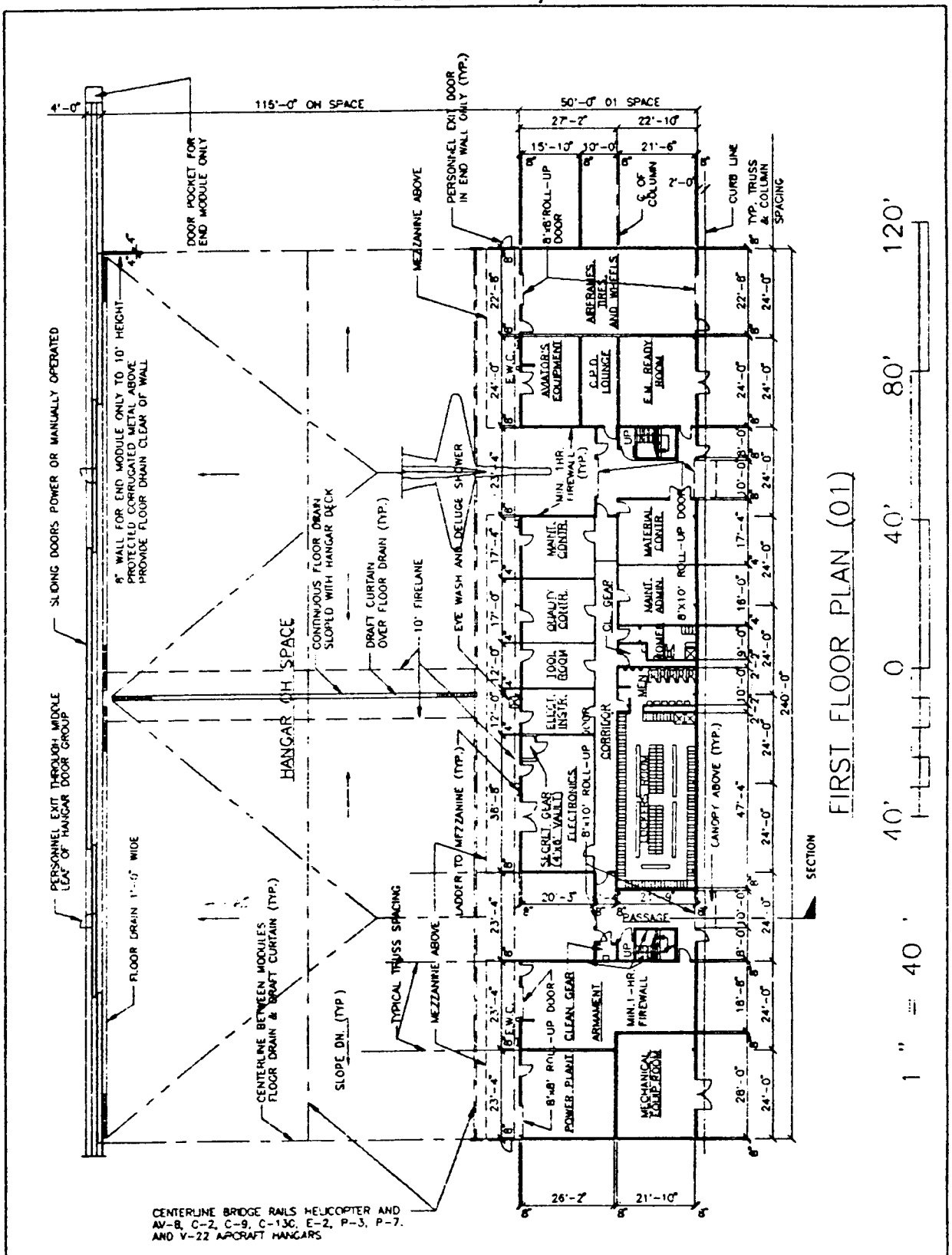
AREAS

GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM	
OH SPACE	19,968 S.F.
01 SPACE	8,690 S.F.
02 SPACE	8,640 S.F.
MEZZANINE	1,536 S.F.
TOTAL	38,834 S.F.

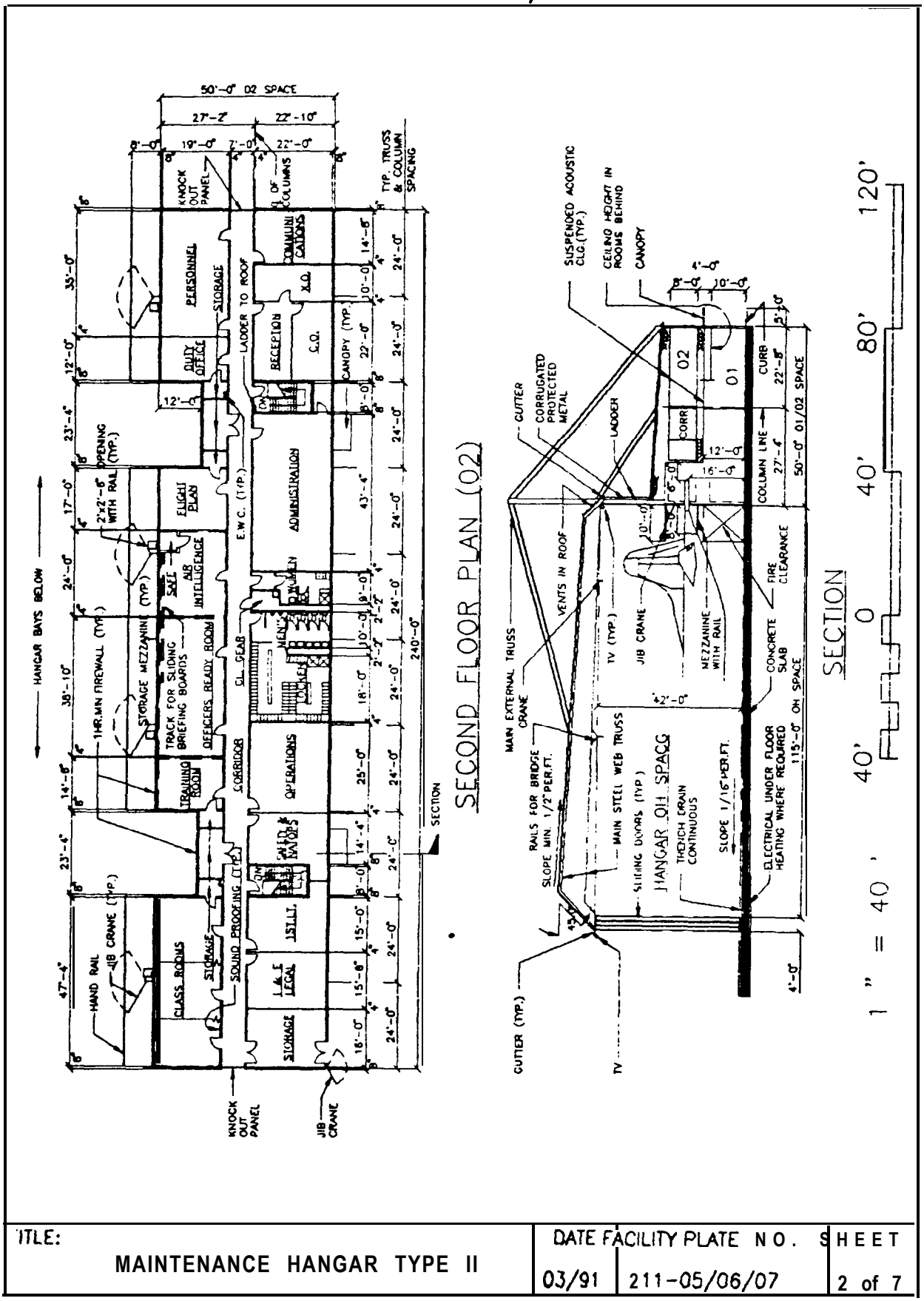
TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE I	03/91	211-05/06/07	8 of 9

Aircraft Type, Model, and Series	Type Hangar Module	Wingspan Normal (ft-in)	Wingspan Folded (ft-in)	Fuselage Length (ft-in)	Max. Height (ft-in)	Weight Empty (lb)	Weight Max T/O (lb)
TA4J	I	27-6		42-7	15-3	10557	24500
EA6B	I	53-0	25-4	54-7	21-11	33163	51000
KA6D	I	53-0	25-4	54-7	21-11	26329	56052
A6E	I	53-0	25-4	54-9	21-11	26600	60400
C2A	I	80-7	35-6	56-8	15-11	31400	55000
F14A	I	64-2	38-2	62-8	16-0	40104	74349
F14B	I	64-2	38-2	62-8	16-0	40104	74349
F14D	I	64-2	38-2	62-8	16-0	40104	74349
UH1N	I	48-2		42-5	14-5	5549	10500
AH1W	I	48-2		42-5	14-5	10200	14750
HH1N	I	48-2		42-5	14-5		
SH2F	I	44-0		38-4	15-6	6953	13500
SH2G	I	44-0		38-4	15-6		
VH3A	I	62-0					
SH3D	I	62-0					
UH3A	I	62-0					
SH3H	I	62-0		54-9	16-10	13465	21000
UH3H	I	62-0		54-9	16-10		
CH46D	I	25-6		46-8	16-8		
UH46D	I	25-6		46-8	16-8		
CH46E	I	25-6		46-8	16-8	15198	24300
HH46D	I	25-6		46-8	16-8		
SH60B	I	53-8		50-0	17-2	13648	19500
SH60F	I	53-8		50-0	17-2	13648	21000
HH60H	I	53-8		50-0	17-2	13648	21000
F/A18A	I	40-5	27-6	56-0	15-4	30000	56000
F/A18B	I	40-5	27-6	56-0	15-4	30000	56000
F/A18C	I	40-5	27-6	56-0	15-4	30000	56000
F/A18D	I	40-5	27-6	56-0	15-4	30000	56000
S3A	I	68-8	29-6	53-4	22-9	27122	52539
US3A	I	~~68-8~~	29-6	53-4	22-9		
S3B	I	68-8	29-6	53-4	22-9		
ES3A	I	68-8	29-6	53-4	22-9		
T2C	I	38-2		38-8	14-10	8115	13179
AV8B	I	30-4		46-4	11-8	13968	31000
TAV8B	I	30-4		46-4	11-8	14223	31000

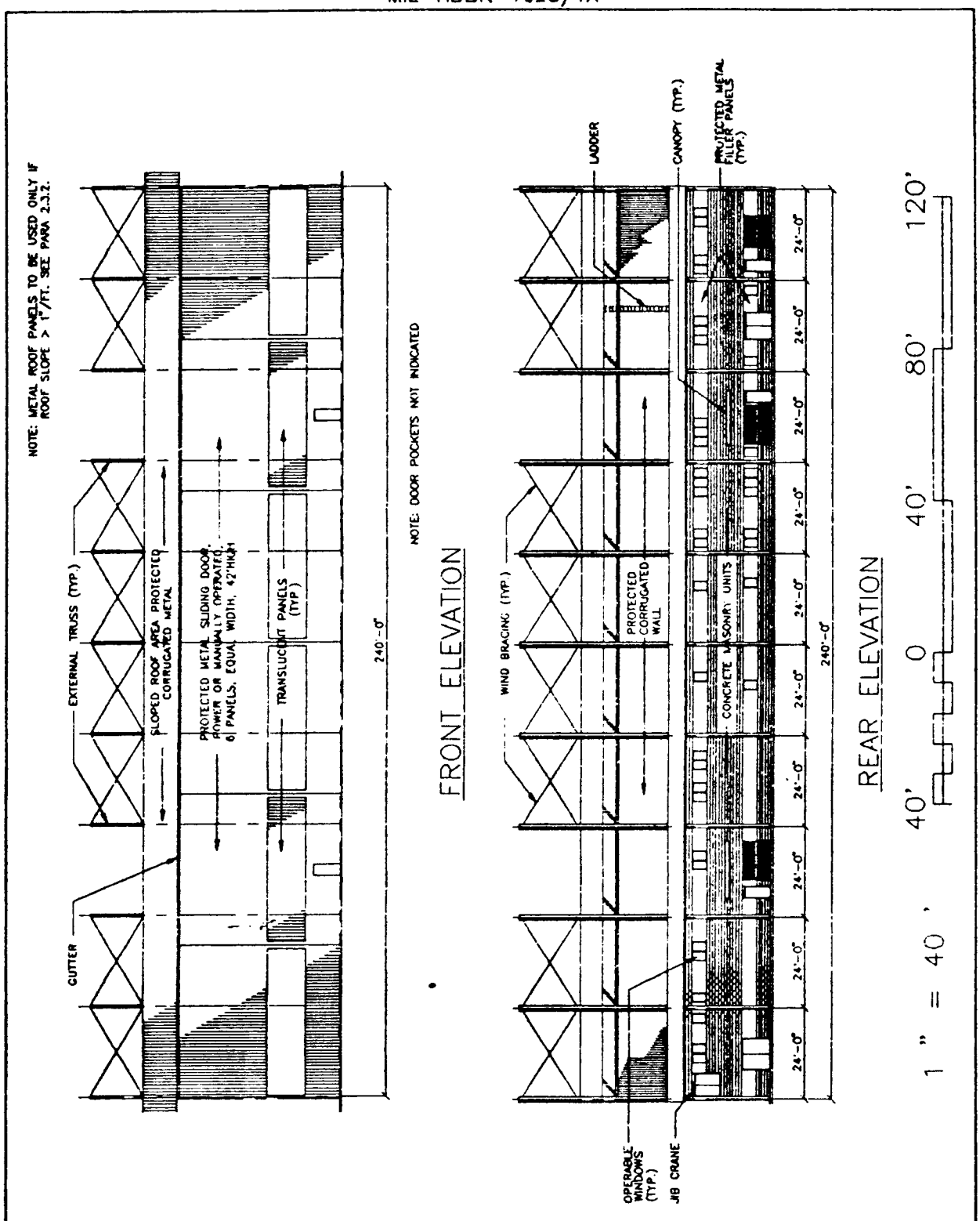
TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE I	03/91	211-05/06/07	9 of 9



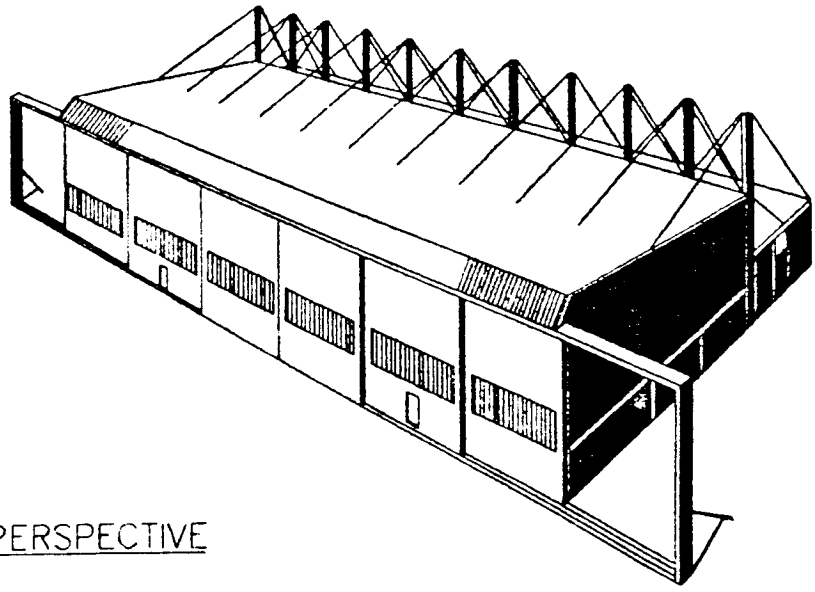
TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE II	03/91	211-05/06/07	1 of 7



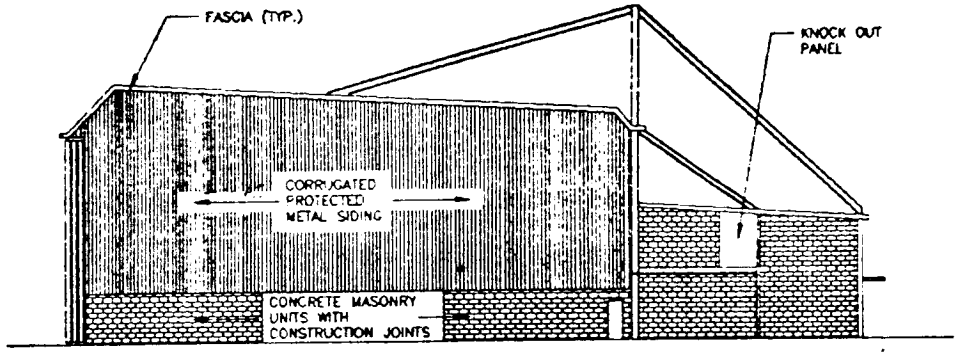
TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE II	03/91	211-05/06/07	2 of 7



TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE II	03/91	211-05/06/07	3 OF 7



PERSPECTIVE

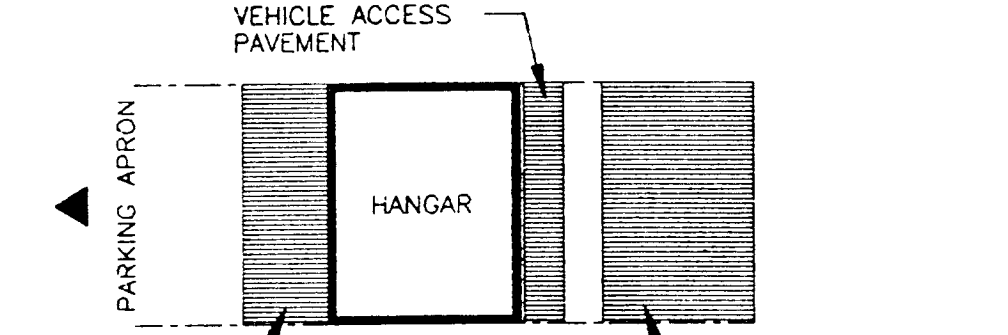


SIDE ELEVATION

1 " = 40 '

40' 0 40' 80' 120'

TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE II	03/91	211-05/06/07	4 of 7



TYPICAL SITE PLAN
SCALE : NONE

THE ARRANGEMENT AND FUNCTIONAL LAYOUT INDICATED SHALL BE FOLLOWED UNLESS PRIOR CLEARANCE FOR CHANGE IS OBTAINED FROM THE NAVAL FACILITIES ENGINEERING COMMAND.

THE ARCHITECTURAL TREATMENT, MATERIALS, FRAMING AND CONSTRUCTION MAY VARY.

UTILITIES REQUIREMENTS INDICATED ARE FOR ESTIMATING PURPOSES ONLY.

GENERAL NOTES:

* IF THE NUMBER OF WOMEN TO BE ASSIGNED IS UNKNOWN, PROVIDE AS A MINIMUM THE TOILET FACILITIES INDICATED ON THE DRAWING.
* FOAM CONCENTRATE TANKS PROPORTIONING EQUIPMENT, FIRE PUMPS AND SPRINKLER VALVES SHALL BE LOCATED IN THE MECHANICAL EQUIPMENT ROOM.
* THE DIMENSIONS OF THE OH SPACE SHOULD BE MODIFIED AS APPROPRIATE TO ACCOMMODATE OVER-SIZE AIRCRAFT SUCH AS C-9 AND C-130.

TITLE: MAINTENANCE HANGAR TYPE II	DATE 03/91	FACILITY PLATE NO. 211-05/06/07	SHEET 5 of 7

PLUMBING REQUIREMENTS

COLD WATER	90 G.P.M.
HOT WATER	01/02 SPACE
RECOVERY RATE (THRU 100°F RISE)	350 G.P.H.
STORAGE	400 GAL.

FIRE PROTECTION REQUIREMENTS

WATER DEMAND	
FOAM-WATER SPRINKLER SYSTEM	4570 G.P.M.
OSCILLATING NOZZLES	1000 G.P.M.
HOSE STREAMS	500 G.P.M.
TOTAL FIRE PROTECTION DEMAND	6070 G.P.M.

HEATING REQUIREMENTS *

INSIDE DESIGN TEMPERATURE	
OH SPACE	60°F
01/02 SPACE	68°F
OUTSIDE DESIGN TEMPERATURE	22°F
HEATING LOAD	
OH SPACE	1,450,000 BTU/HR
01/02 SPACE	250,000 BTU/HR

* BASED ON NORFOLK VIRGINIA AREA

AIR CONDITIONING REQUIREMENTS *

INSIDE DESIGN TEMPERATURE	76°F.D.B.
INSIDE DESIGN HUMIDITY	50 %
OUTSIDE DESIGN TEMPERATURE	91°F.D.B.
OUTSIDE DESIGN TEMPERATURE	77°F.W.B.
COOLING LOAD, 01/02 SPACES (EXCLUDING MECH.RM., PASSAGES, STAIRS, TOILETS, POWER PLANTS, AVIATORS EQ, & AIR FRAMES)	545,000 BTU/HR

ELECTRICAL REQUIREMENTS (KW)

	OH SPACE	01/02 SPACE
LIGHTS		
CONNECTED LOAD	56	84
ESTIMATED DEMAND	56	84
POWER		
CONNECTED LOAD	837	208
ESTIMATED DEMAND	418	104
TOTAL		
CONNECTED LOAD	893	292
ESTIMATED DEMAND	474	188

ADDITIONAL DEMAND FOR AIRCONDITIONING 63

AREAS

GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM

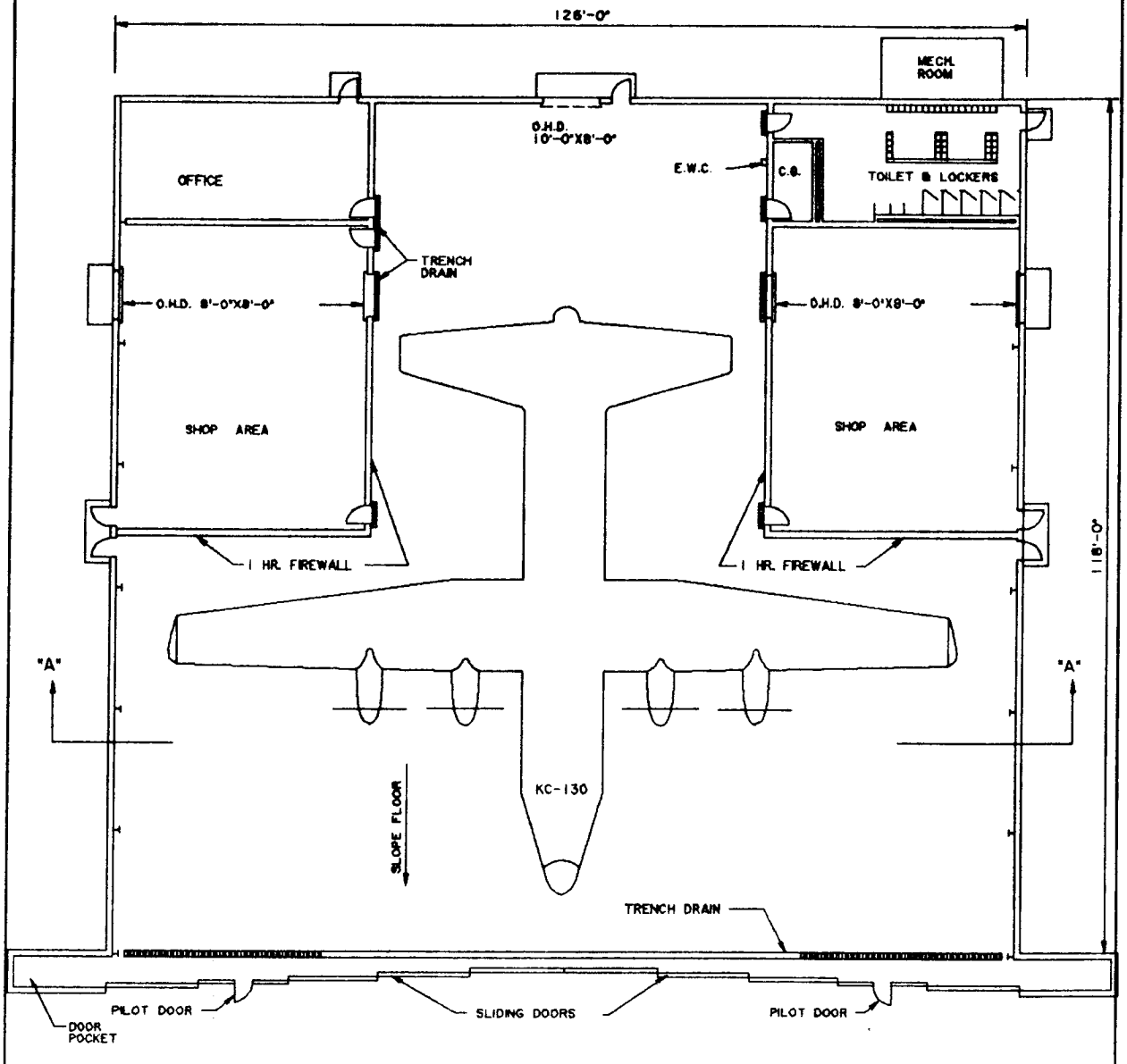
OH SPACE	28,560 S.F.
01 SPACE	12,050 S.F.
02 SPACE	12,000 S.F.
MEZZANINE	1,536 S.F.
TOTAL	54,146 S.F.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
MAINTENANCE HANGAR TYPE II	03/91	211-05/06/07	6 of 7

Aircraft Type, Model, and Series	Type Hangar Module	Wingspan Normal (ft-in)	Wingspan Folded (ft-in)	Fuselage Length (ft-in)	Max. Height (ft-in)	Weight Empty (lb)	Weight Max T/O (lb)
C130T	II	132-7		97-9	38-3	79981	175000
KC130F	II	132-7		97-9	38-3	79981	175000
LC130F	II	132-7		97-9	38-3	79981	175000
KC130R	II	132-7		97-9	38-3	79981	175000
LC130R	II	132-7		97-9	38-3	79981	175000
TC130Q	II	132-7		97-9	38-3	79981	175000
KC130T	II	132-7		97-9	38-3	79981	175000
CH53D	II	72-3		73-4	29-5	23628	42000
CH53E	II	79-0		73-4	29-5	33226	73500
RH53D	II	79-0					
P3B	II	99-8		116-10	33-9	61500	135000
P3C	II	99-8		116-10	33-9	66200	143000
RP3D	II	99-8		116-10	33-9	61500	135000
EP3E	II	99-8		116-10	33-9	61500	135000
RP3A	II	99-8		116-10	33-9	61500	135000
VP3A	II	99-8		116-10	33-9	61500	135000
UP3A	II	99-8		116-10	33-9	61500	135000
TP3A	II	99-8		116-10	33-9	61500	135000
UP3B	II	99-8		116-10	33-9	61500	135000
EP3J	II	99-8		116-10	33-9	61500	135000
E2C	II*	80-7	29-4	57-7	18-4	39373	53267
MH53E	II*	79-0					

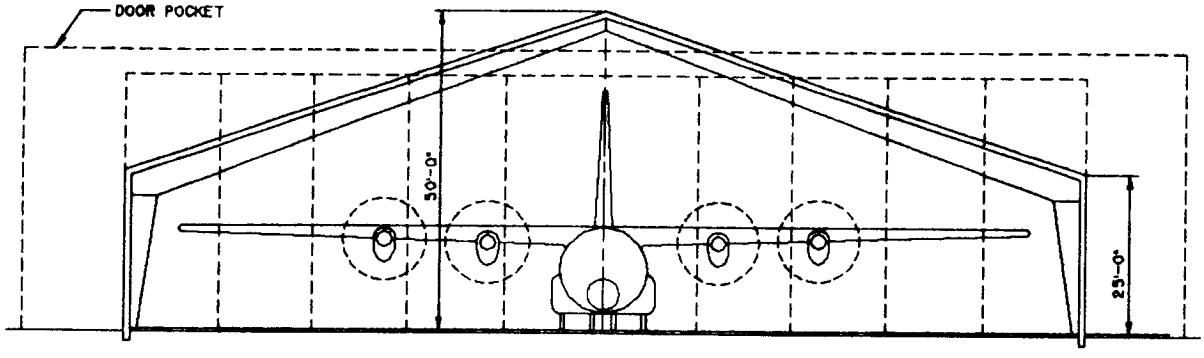
*-E2C & MH53E are carrier type aircraft that could require larger special mission hangars similar to a type II. Consult NAVAIR for guidance.

TITLE: MAINTENANCE HANGAR TYPE II	DATE 03/91	FACILITY PLATE NO. 211-05/06/07	SHEET 7 of 7



FLOOR PLAN
NOT TO SCALE

TITLE:	DATE	FACILITY PLATE NO.	SHEET
PRE-ENGINEERED MAINTENANCE HANGAR	03/91	211-04	1 OF 4



SECTION "A"-"A"
NOT TO SCALE

TITLE: PRE-ENGINEERED MAINTENANCE HANGAR	DATE 03/91	FACILITY PLATE NO. 211-04	SHEET 2 OF 4

ARCHITECTURAL REQUIREMENTS

THE DRAWINGS INDICATED IN THIS FACILITY PLATE ARE INTENDED TO PROVIDE GUIDANCE FOR A MINIMUM SUITABLE FACILITY FOR AIRCRAFT MAINTENANCE.

THE ARRANGEMENT AND FUNCTIONAL LAYOUT INDICATED SHALL BE FOLLOWED UNLESS PRIOR CLEARANCE FOR CHANGE IS OBTAINED FROM THE NAVAL FACILITIES ENGINEERING COMMAND. THE ARCHITECTURAL TREATMENT, MATERIALS FRAMING, AND CONSTRUCTION MAY VARY.

DIMENSIONS SHOWN CONFORM TO STOCK DIMENSIONS AND DETAILING OF STANDARD PRE-ENGINEERED STRUCTURES.

DOOR POCKETS AND SLIDING DOORS MAY BE OMITTED IN WARM CLIMATES AT THE OPTION OF THE COMMAND.

WHEN LOCATION REQUIRES, STRUCTURAL DESIGN SHOULD INCORPORATE SUFFICIENT ANCHORAGE AND BRACING FOR EXTREME WIND LOAD.

VERIFY HORIZONTAL AND VERTICAL DIMENSIONS OF ALL AIRCRAFT TO BE ACCOMMODATED. PROVIDE A 3-TON CAPACITY FLOOR SUPPORTED, MOVABLE CRANE.

PROVIDE MOVABLE PARTITION IF REQUIRED TO MEET SPECIAL SPACE LOCATIONS WITHIN SHOP AREA.

UTILITIES REQUIREMENTS INDICATED ARE FOR ESTIMATING PURPOSES ONLY.

PROVIDE MECHANICAL ROOM IF REQUIRED, SIZED TO FIT EQUIPMENT.

FIRE PROTECTION REQUIREMENTS

PROVIDE SEALED HEAD AUTOMATIC SPRINKLERS IN OFFICE, SHOP AREAS, TOILET AND LOCKERS, AND C.G. SPACES.

PROVIDE FOAM-WATER SPRINKLER SYSTEM (0.16 GPM/SQ. FT.) WITH STANDARD SPRINKLERS SUPPLIED THROUGH AUTOMATIC DELUGE VALVES FOR HANGAR AREA. LOCATE DELUGE VALVES IN SHOP AREAS.

PROVIDE 3 AUTOMATIC/MANUALLY ACTIVATED 500 GPM OSCILLATING NOZZLES IN HANGAR. ACTIVATE NOZZLES WITH OVERHEAD DELUGE SYSTEM, OPERATION OF ANY TWO DUAL SPECTRUM (UV/IR) OPTICAL DETECTORS, OR MANUAL RELEASES.

HANGAR WATER FLOW DEMAND 4,000 GPM FOR 45 MIN. + 500 GPM FOR EXTERIOR FIRE HYDRANTS.

PROVIDE TWO 2,500 GAL. AFT STORAGE TANKS AND FOAM EQUIPMENT IN AREA SEPARATED FROM HANGAR BY 1 HOUR CONSTRUCTION.

TITLE: PRE-ENGINEERED MAINTENANCE HANGAR	DATE 03/91	FACILITY PLATE NO. 211-04	SHEET 3 OF 4

COMMUNICATIONS REQUIREMENTS

PROVIDE TELEPHONE JACKS THOUGHOUT THE STRUCTURE SO THAT IF REQUIRED A VOICE COMMUNICATION SYSTEM CAN BE ESTABLISHED BETWEEN VARIOUS AREAS WITHIN THE HANGAR AND OTHER FACILITIES OF THE ACTIVITY. THE FOLLOWING JACK DISTRIBUTION IS RECOMMENDED:

OFFICE	1	
SHOP AREAS	4	12 EQUALLY SPACED ALONG EACH PARTITION DIVIDING SHOP AND HANGAR AREA)
HANGAR AREA	4	(2 EQUALLY SPACED ALONG EACH PARTITION DIVIDING SHOP AND HANGAR AREA)

GROSS AREA 2 1 ,466 SC?. FT.

PLUMBING REQUIREMENTS

WATER

COLD	65 GPM	
	DOES NOT INCLUDE FIRE PROTECTION REQUIREMENTS	
HOT	35 GPM	RECOVERY RATE 1 1 00°F RISE
	35 GAL.	STORAGE

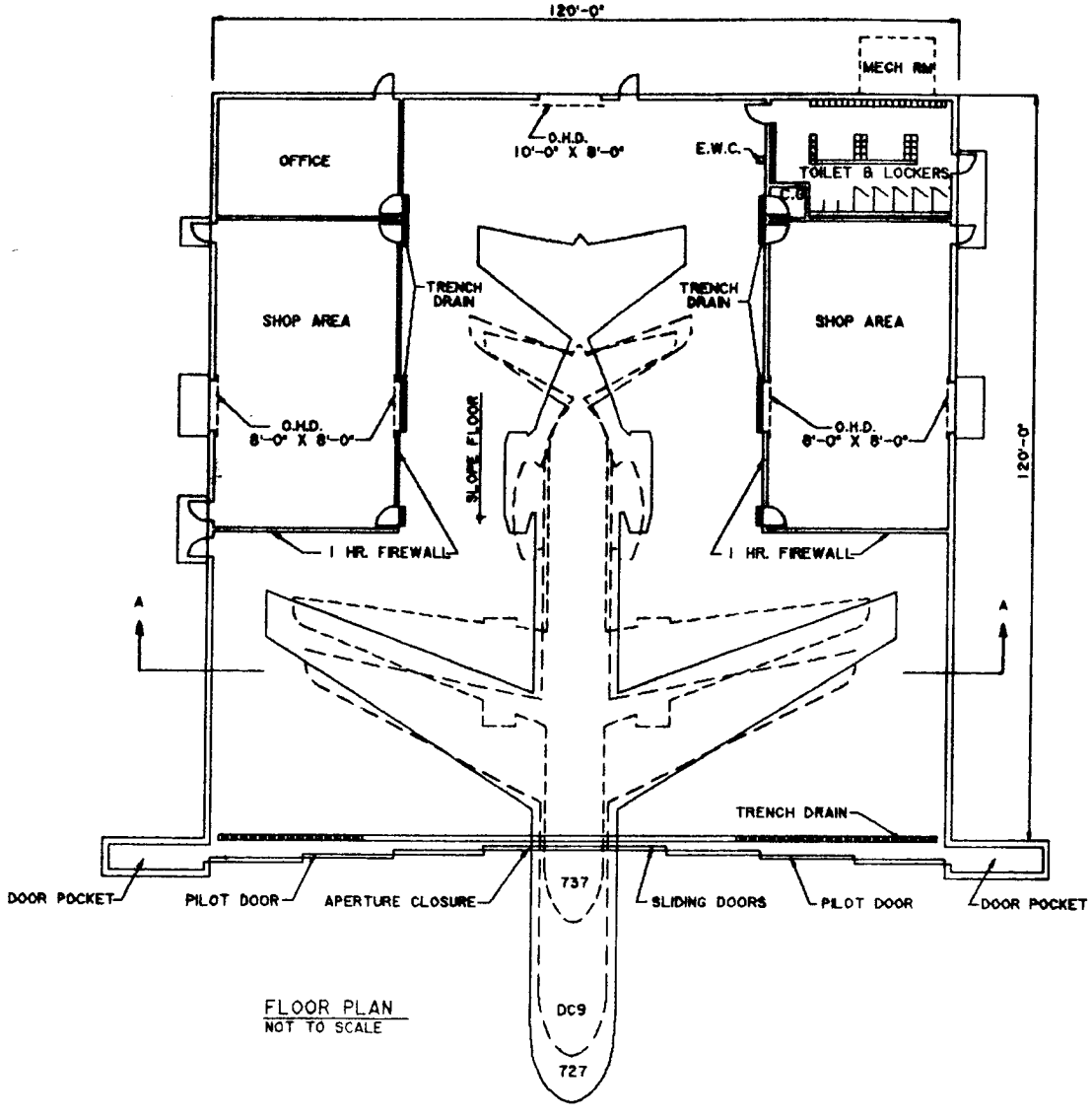
HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE	-50° F	+50° F	+150° F	+250° F
	1834	1572	1310	1048

ELECTRICAL REQUIREMENTS (KW)

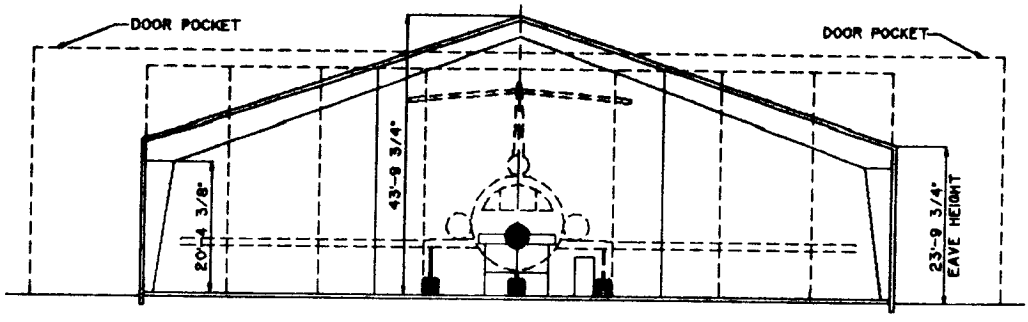
	LIGHTING	POWER	TOTAL
CONNECTED LOAD	65	99	164
ESTIMATED DEMAND	65	79	144

ITLE: PRE-ENGINEERED MAINTENANCE HANGAR	DATE 03/91	FACILITY PLATE NO. 2 1 1-04	SHEET 4 OF 4



FLOOR PLAN
NOT TO SCALE

TITLE: PRE-ENGINEERED MAINTENANCE HANGAR	DATE 03/91	FACILITY PLATE NO. 211-04	SHEET 1 OF 4



SECTION A
NOT TO SCALE

TITLE: PRE-ENGINEERED MAINTENANCE HANGAR	DATE 03/91	FACILITY PLATE NO. 211-04	SHEET 2 OF 4

ARCHITECTURAL REQUIREMENTS

THE DRAWINGS INDICATED IN THIS FACILITY PLATE ARE INTENDED TO PROVIDE GUIDANCE FOR A MINIMUM SUITABLE FACILITY FOR AIRCRAFT MAINTENANCE.

THE ARRANGEMENT AND FUNCTIONAL LAYOUT INDICATED SHALL BE FOLLOWED UNLESS PRIOR CLEARANCE FOR CHANGE IS OBTAINED FROM THE NAVAL FACILITIES ENGINEERING COMMAND. THE ARCHITECTURAL TREATMENT, MATERIALS FRAMING, AND CONSTRUCTION MAY VARY.

DIMENSIONS SHOWN CONFORM TO STOCK DIMENSIONS AND DETAILING OF STANDARD PRE-ENGINEERED STRUCTURES.

DOOR POCKETS AND SLIDING DOORS MAY BE OMITTED IN WARM CLIMATES AT THE OPTION OF THE COMMAND.

WHEN LOCATION REQUIRES, STRUCTURAL DESIGN SHOULD INCORPORATE SUFFICIENT ANCHORAGE AND BRACING FOR EXTREME WIND LOAD.

VERIFY HORIZONTAL AND VERTICAL DIMENSIONS OF ALL AIRCRAFT TO BE ACCOMMODATED. PROVIDE A 3-TON CAPACITY FLOOR SUPPORTED, MOVABLE CRANE.

PROVIDE MOVABLE PARTITION IF REQUIRED TO MEET SPECIAL SPACE LOCATIONS WITHIN SHOP AREA.

UTILITIES REQUIREMENTS INDICATED ARE FOR ESTIMATING PURPOSES ONLY.

PROVIDE MECHANICAL ROOM IF REQUIRED, SIZED TO FIT EQUIPMENT.

FIRE PROTECTION REQUIREMENTS

PROVIDE SEALED HEAD AUTOMATIC SPRINKLERS IN OFFICE, SHOP AREAS, TOILET AND LOCKERS, AND C.G. SPACES.

PROVIDE FOAM-WATER SPRINKLER SYSTEM (0.16 GPM/SQ. FT.) WITH STANDARD SPRINKLERS SUPPLIED THROUGH AUTOMATIC DELUGE VALVES FOR HANGAR AREA. LOCATE DELUGE VALVES IN SHOP AREAS.

PROVIDE 3 AUTOMATIC/MANUALLY ACTIVATED 500 GPM OSCILLATING NOZZLES IN HANGAR. ACTIVATE NOZZLES WITH OVERHEAD DELUGE SYSTEM, OPERATION OF ANY TWO DUAL SPECTRUM (UV/IR) OPTICAL DETECTORS, OR MANUAL RELEASES.(THROTTLE FOR 0.10 GPM/FT. FLOOR AREA)

HANGAR WATER FLOW DEMAND 2,500 GPM FOR 45 MIN. + 500 GPM FOR EXTERIOR FIRE HYDRANTS.

PROVIDE TWO 1,600 GAL. AFT STORAGE TANKS AND FOAM EQUIPMENT IN AREA SEPARATED FROM HANGAR BY 1 HOUR CONSTRUCTION.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
PRE-ENGINEERED MAINTENANCE HANGAR	03/91	211-04	3 OF 4

COMMUNICATIONS REQUIREMENTS

PROVIDE TELEPHONE JACKS THOUGHOUT THE STRUCTURE SO THAT IF REQUIRED, A VOICE COMMUNICATION SYSTEM CAN BE ESTABLISHED BETWEEN VARIOUS AREAS WITHIN THE HANGAR AND OTHER FACILITIES OF THE ACTIVITY. THE FOLLOWING JACK DISTRIBUTION IS RECOMMENDED:

OFFICE	1	
SHOP AREAS	4	12 EQUALLY SPACED ALONG EACH PARTITION DIVIDING SHOP AND HANGAR AREA)
HANGAR AREA	4	12 EQUALLY SPACED ALONG EACH PARTITION DIVIDING SHOP AND HANGAR AREA)

GROSS AREA 14,700 SQ. FT.

PLUMBING REQUIREMENTS

WATER

COLD 65 GPM
DOES NOT INCLUDE FIRE PROTECTION REQUIREMENTS
HOT 35 GPM RECOVERY RATE (100°F RISE)
35 GAL. STORAGE

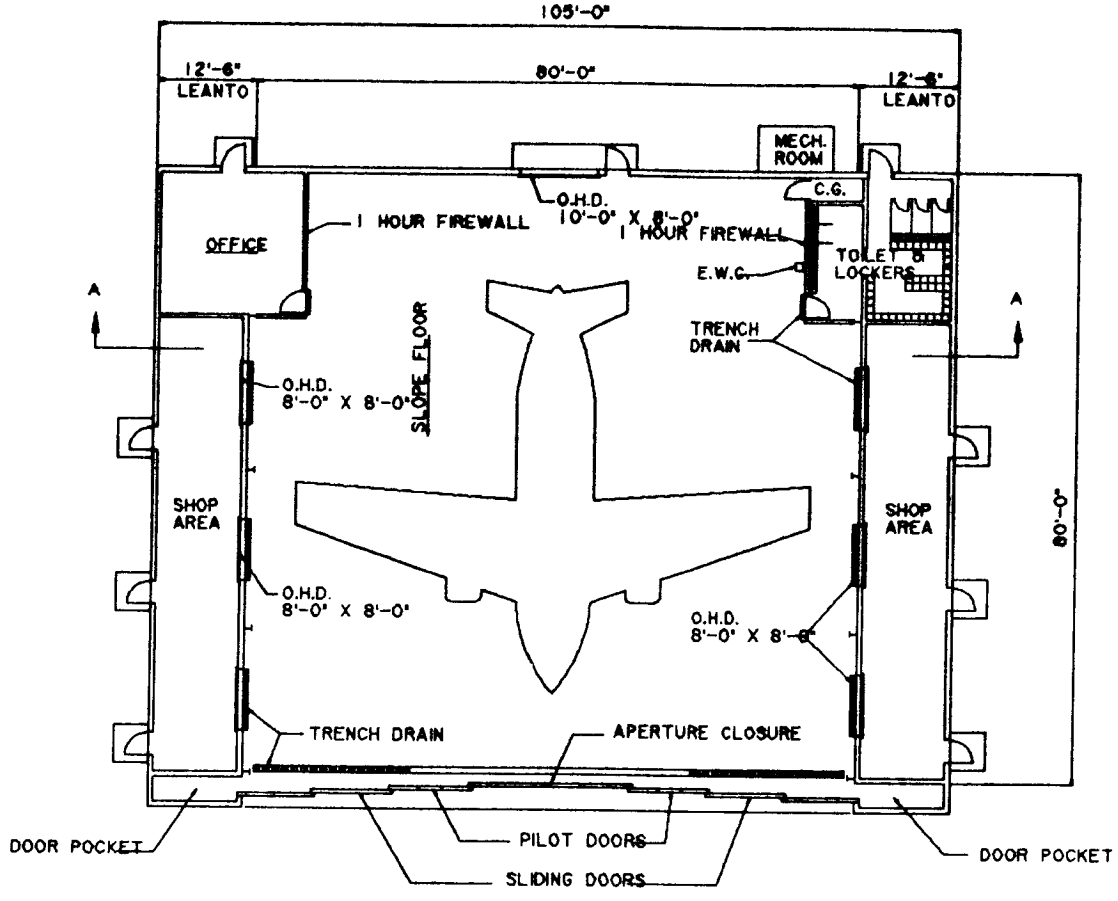
HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE	-50°F	+50°F	+150°F	+250°F
	1,335	1,145	958	763

ELECTRICAL REQUIREMENTS (KW)

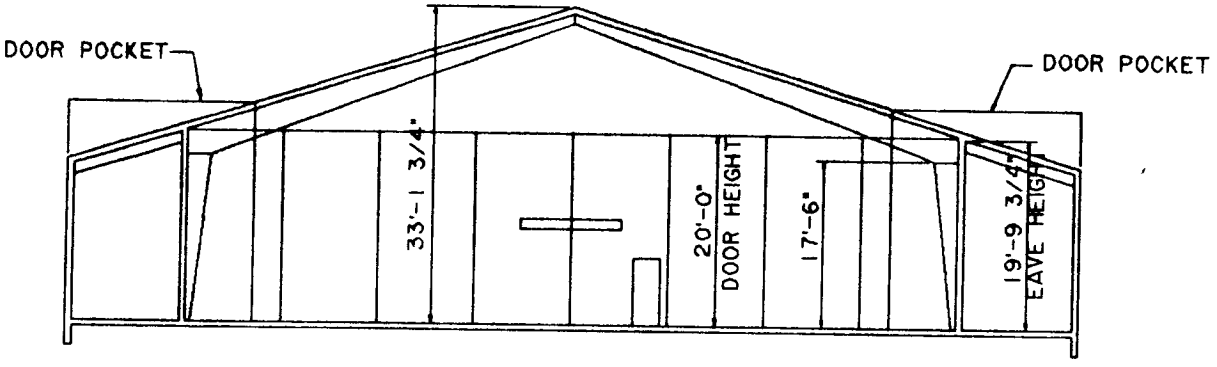
	LIGHTING	POWER	TOTAL
CONNECTED LOAD	72	100.8	172.8
ESTIMATED DEMAND	68.4	90.72	159.12

TITLE:	DATE	FACILITY PLATE NO.	SHEET
PRE-ENGINEERED MAINTENANCE HANGAR	03/91	211-04	4 OF 4



FLOOR PLAN
NOT TO SCALE

TITLE: PRE-ENGINEERED MAINTENANCE HANGAR	DATE 03/91	FACILITY PLATE NO. 211-04	SHEET 1 OF 4



SECTION A
NOT TO SCALE

TITLE: PRE-ENGINEERED MAINTENANCE HANGAR	DATE 03/91	FACILITY PLATE NO. 211-04	SHEET 2 OF 4

ARCHITECTURAL REQUIREMENTS

THE DRAWINGS INDICATED IN THIS FACILITY PLATE ARE INTENDED TO PROVIDE GUIDANCE FOR A MINIMUM SUITABLE FACILITY FOR AIRCRAFT MAINTENANCE.

THE ARRANGEMENT AND FUNCTIONAL LAYOUT INDICATED SHALL BE FOLLOWED UNLESS PRIOR CLEARANCE FOR CHANGE IS OBTAINED FROM THE NAVAL FACILITIES ENGINEERING COMMAND. THE ARCHITECTURAL TREATMENT, MATERIALS FRAMING, AND CONSTRUCTION MAY VARY.

DIMENSIONS SHOWN CONFORM TO STOCK DIMENSIONS AND DETAILING OF STANDARD PRE-ENGINEERED STRUCTURES.

DOOR POCKETS AND SLIDING DOORS MAY BE OMITTED IN WARM CLIMATES AT THE OPTION OF THE COMMAND.

WHEN LOCATION REQUIRES, STRUCTURAL DESIGN SHOULD INCORPORATE SUFFICIENT ANCHORAGE AND BRACING FOR EXTREME WIND LOAD.

VERIFY HORIZONTAL AND VERTICAL DIMENSIONS OF ALL AIRCRAFT TO BE ACCOMMODATED. PROVIDE A 3-TON CAPACITY FLOOR SUPPORTED, MOVABLE CRANE.

PROVIDE MOVABLE PARTITION IF REQUIRED TO MEET SPECIAL SPACE LOCATIONS WITHIN SHOP AREA.

UTILITIES REQUIREMENTS INDICATED ARE FOR ESTIMATING PURPOSES ONLY.

PROVIDE MECHANICAL ROOM IF REQUIRED, SIZED TO FIT EQUIPMENT.

FIRE PROTECTION REQUIREMENTS

PROVIDE SEALED HEAD AUTOMATIC SPRINKLERS IN OFFICE, SHOP AREAS, TOILET AND LOCKERS, AND C.G. SPACES.

PROVIDE FOAM-WATER SPRINKLER SYSTEM (0.16 GPM/SQ. FT.) WITH STANDARD SPRINKLERS SUPPLIED THROUGH AUTOMATIC DELUGE VALVES FOR HANGAR AREA. LOCATE DELUGE VALVES IN SHOP AREAS.

PROVIDE 2 AUTOMATIC/MANUALLY ACTIVATED 500 GPM OSCILLATING NOZZLES IN HANGAR. ACTIVATE NOZZLES WITH OVERHEAD DELUGE SYSTEM, OPERATION OF ANY TWO DUAL SPECTRUM (THROTTLE FOR 0.10 GPM/FT. FLOOR AREA)

HANGAR WATER FLOW DEMAND 15,000 GPM FOR 45 MIN. + 500 GPM FOR EXTERIOR FIRE HYDRANTS.

PROVIDE TWO 1,000 GAL. AFT STORAGE TANKS AND FOAM EQUIPMENT IN AREA SEPARATED FROM HANGAR BY 1 HOUR CONSTRUCTION.

TITLE: PRE-ENGINEERED MAINTENANCE HANGAR	DATE 03/91	FACILITY PLATE NO. 211-04	SHEET 3 OF 4

COMMUNICATIONS REQUIREMENTS

PROVIDE TELEPHONE JACKS THOUGHOUT THE STRUCTURE SO THAT IF REQUIRED, A VOICE COMMUNICATION SYSTEM CAN BE ESTABLISHED BETWEEN VARIOUS AREAS WITHIN THE HANGAR AND OTHER FACILITIES OF THE ACTIVITY. THE FOLLOWING JACK DISTRIBUTION IS RECOMMENDED:

OFFICE	1	
SHOP AREAS	4	(2 EQUALLY SPACED ALONG EACH PARTITION DIVIDING SHOP AND HANGAR AREA)
HANGAR AREA	4	(2 EQUALLY SPACED ALONG EACH PARTITION DIVIDING SHOP AND HANGAR AREA)

GROSS AREA 8,800 SQ. FT.

PLUMBING REQUIREMENTS

WATER

COLD 65 GPM
DOES NOT INCLUDE FIRE PROTECTION REQUIREMENTS
HOT 35 GPM RECOVERY RATE (100°F RISE)
35 GAL. STORAGE

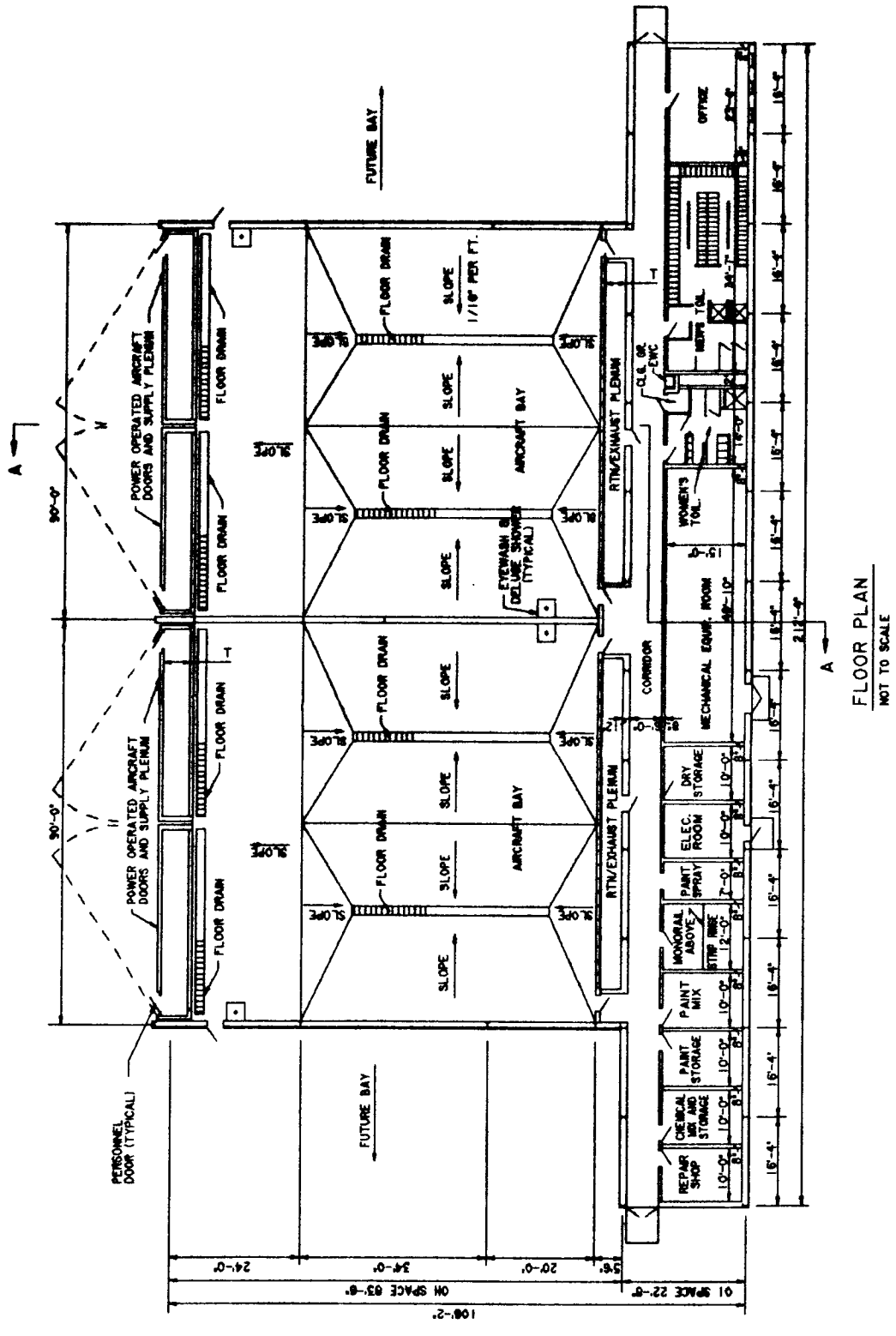
HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE	-50° F	+50° F	+150° F	+250° F
	826	708	590	472

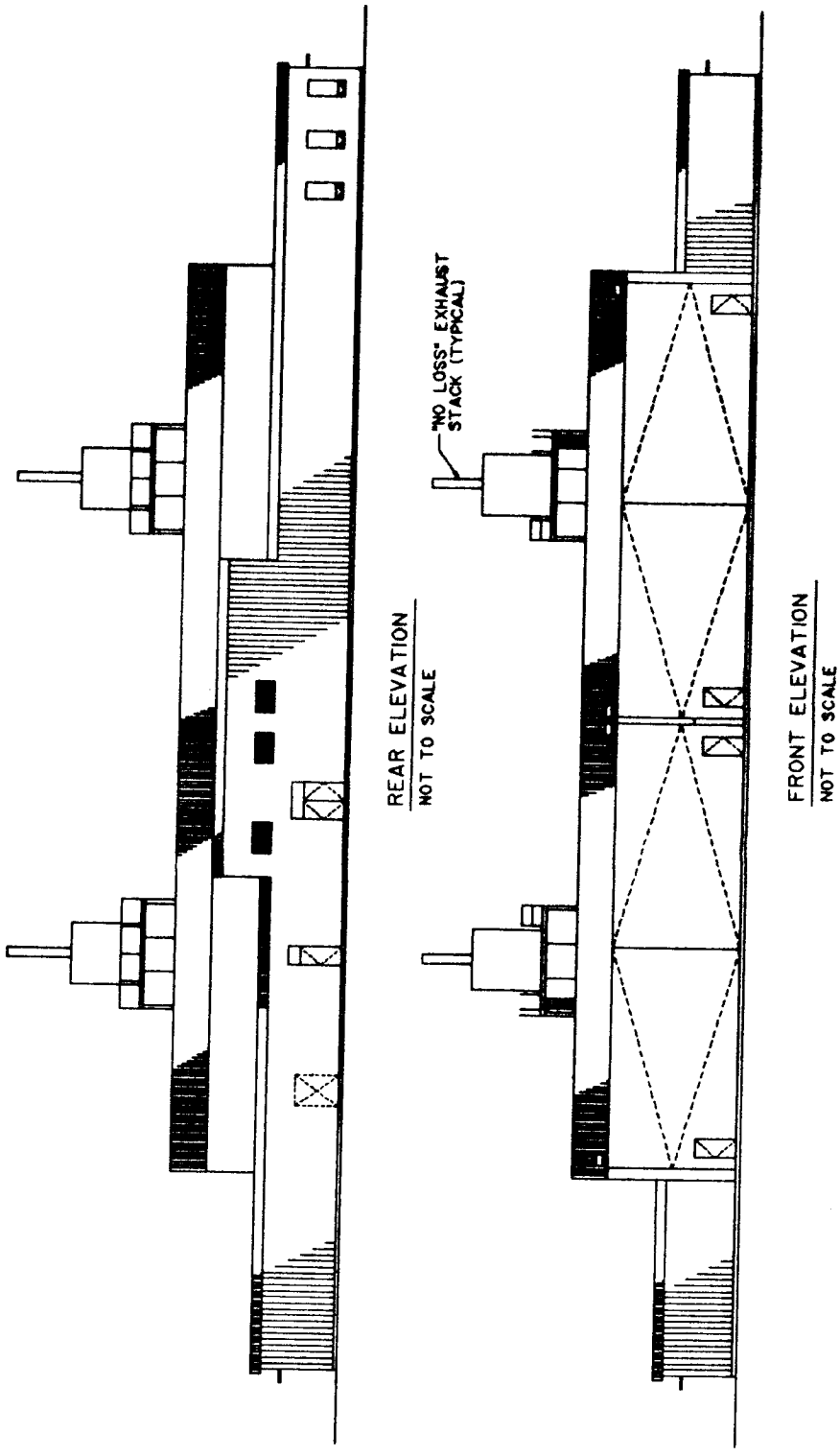
ELECTRICAL REQUIREMENTS (KW)

	LIGHTING	POWER	TOTAL
CONNECTED LOAD	44	62	106
ESTIMATED DEMAND	41.8	55.8	97.5

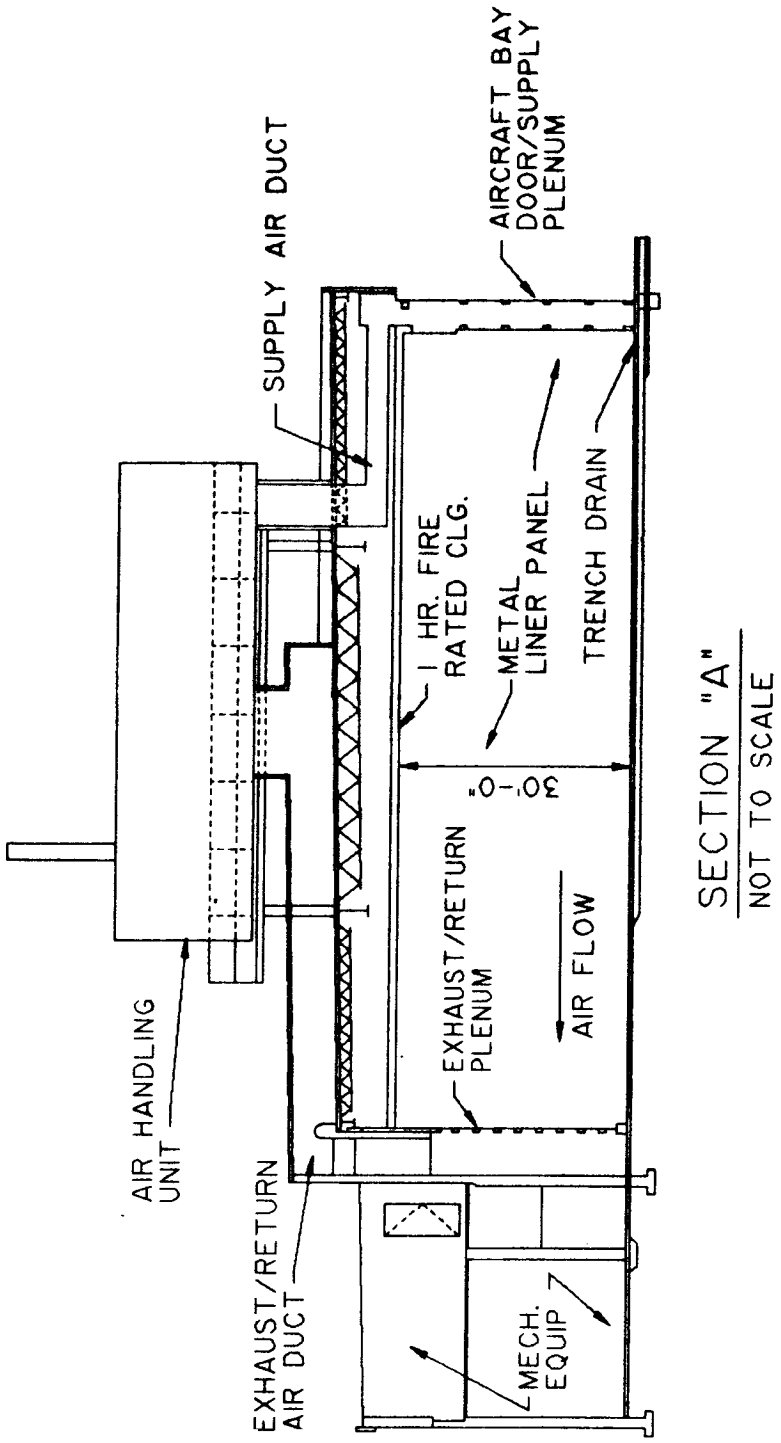
TITLE:	DATE	FACILITY PLATE NO.	SHEET
PRE-ENGINEERED MAINTENANCE HANGAR	03/91	211-04	4 OF 4



TITLE: CORROSION CONTROL HANGAR TYPE "A" SMALL	DATE 03/91	FACILITY PLATE NO. 211-03	SHEET 1 OF 4



TITLE: CORROSION CONTROL HANGAR TYPE "A" SMALL	DATE 03/91	FACILITY PLATE NO. 211-03	SHEET 2 OF 4



SECTION "A"
NOT TO SCALE

TITLE: CORROSION CONTROL HANGAR TYPE "A" SMALL	DATE 03/91	FACILITY PLATE NO. 211-03	SHEET 3 OF 4

NOTES

PLUMBING REQUIREMENTS

COLD WATER	65 G.P.M.
HOT WATER (01 SPACE)	40 G.P.H.
RECOVERY RATE (THRU 100° F RISE)	
STORAGE	40 GAL.

FIRE PROTECTION REQUIREMENTS

SPRINKLERS (FOAM-WATER)	1123 G.P.M.
OSCILLATING NOZZLES	702 G.P.M.
HOSE STREAMS	500 G.P.M.
TOTAL (EACH BAY)	2325 G.P.M.

HEATING REQUIREMENTS*

INSIDE DESIGN TEMPERATURE	
OH SPACE	85°F
01 SPACE	68°F
OUTSIDE DESIGN TEMPERATURE	22°F
HEATING LOAD	
OH SPACE	36,740,000 BTU/HR (W/O HEAT RECOVERY)
01 SPACE	167,000 BTU/HR

AIR CONDITIONING REQUIREMENTS*

INSIDE DESIGN TEMPERATURE	76° F.D.B.
INSIDE DESIGN HUMIDITY	50%
OUTSIDE DESIGN TEMPERATURE	91° F.D.B.
	76° F.W.B.
COOLING LOAD, OFFICE	12,000 BTU/HR

ELECTRICAL REQUIREMENTS (KW)

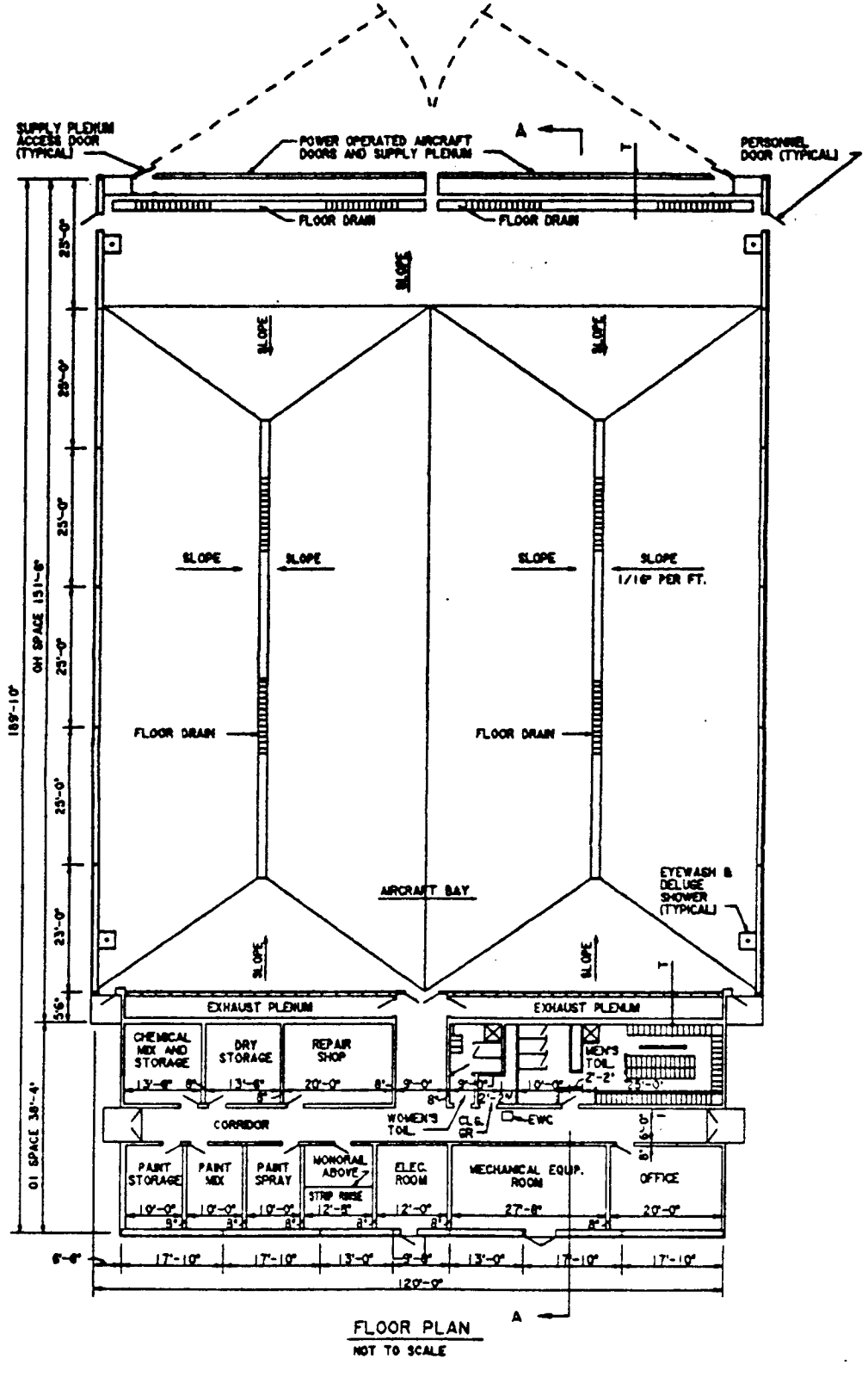
	MODULE OH SPACE	01 SPACE
LIGHTS		
CONNECTED LOAD	40	4
POWER		
CONNECTED LOAD	1289	4
TOTAL		
CONNECTED LOAD	1329	8
ESTIMATED DEMAND	1273	4
ADDITIONAL DEMAND FOR AIR CONDITIONING, OFFICE		2

BAY DIMENSIONS

BAY DIMENSIONS SHOWN WILL SUPPORT S-3 AIRCRAFT, AND PROVIDE 10 FOOT HORIZONTAL AND 6 FOOT VERTICAL CLEARANCE BETWEEN AIRCRAFT AND HANGAR BAY WALLS/DOORS/CEILINGS. REDUCED CLEARANCES SHALL NOT BE USED WITHOUT PRIOR NAVFAC APPROVAL.

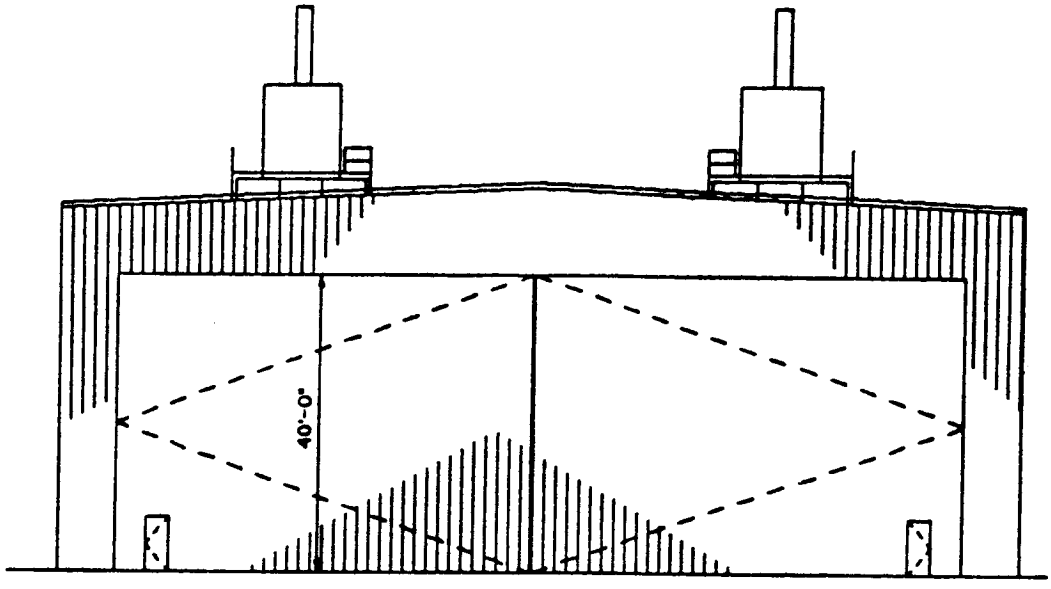
* REQUIREMENTS BASED ON NORFOLK, VIRGINIA AREA. PROVIDE COOLING FOR OFFICE SPACE ONLY. OH SPACE HEATING REQUIREMENTS VARY, VERIFY SPECIFIC FACILITY REQUIREMENTS.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
CORROSION CONTROL HANGAR TYPE "A" SMALL	03/91	211-03	4 OF 4

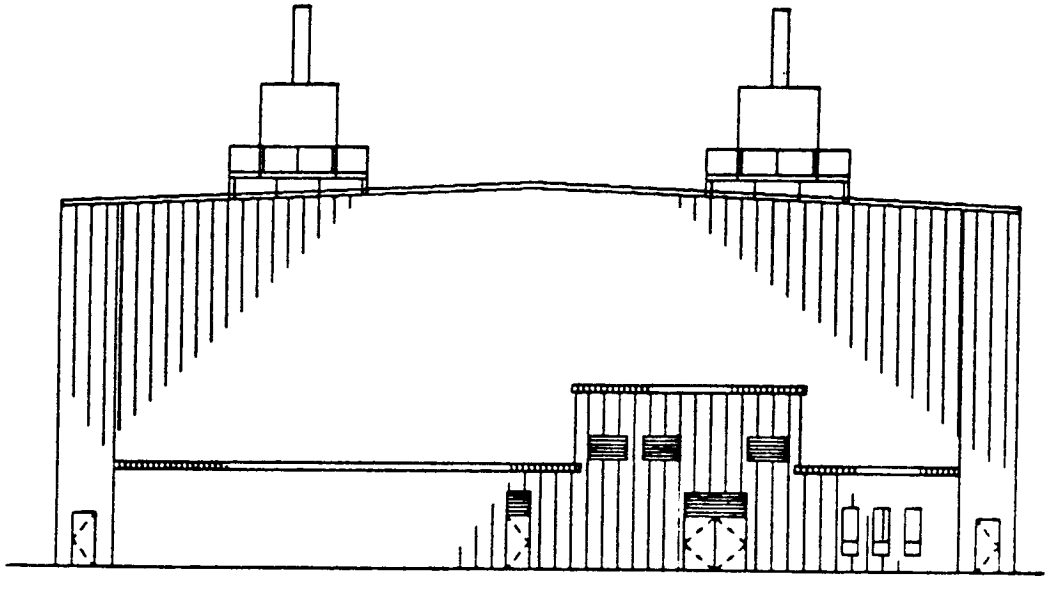


FLOOR PLAN
NOT TO SCALE

TITLE: CORROSION CONTROL HANGAR TYPE "B" LARGE	DATE 03/91	FACILITY PLATE NO. 211-03	SHEET 1 OF 5

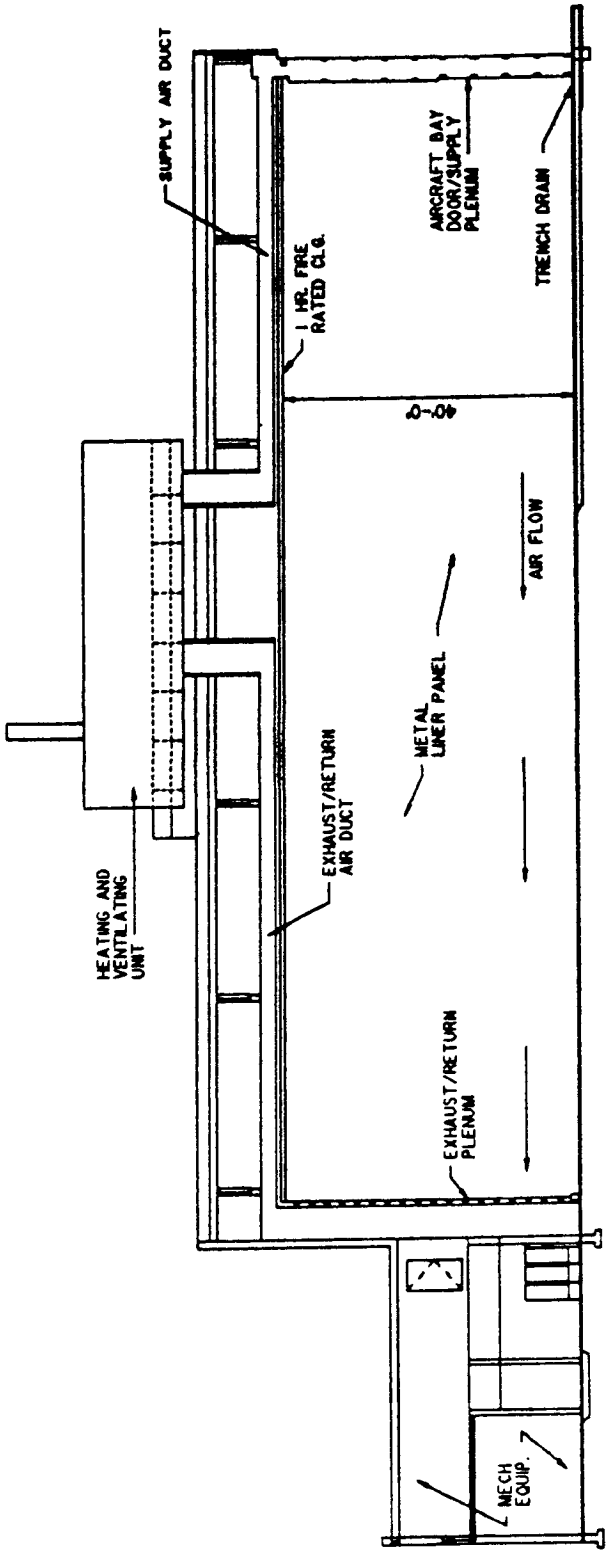


FRONT ELEVATION
NOT TO SCALE



REAR ELEVATION
NOT TO SCALE

TITLE: CORROSION CONTROL HANGAR TYPE "B" LARGE	DATE 03/91	FACILITY PLATE NO. 211-03	SHEET 2 OF 5



SECTION 'A'
NOT TO SCALE

TITLE: CORROSION CONTROL HANGAR TYPE "B" LARGE	DATE 03/91	FACILITY PLATE NO. 211-03	SHEET 3 OF 5

NOTES

PLUMBING REQUIREMENTS

COLD WATER	80 G.P.M.
HOT WATER (01 SPACE)	55 G.P.H.
RECOVERY RATE (THRU 100° F RISE)	
STORAGE	55 GAL.

FIRE PROTECTION REQUIREMENTS

SPRINKLERS (FOAM-WATER)	2803 G.P.M.
OSCILLATING NOZZLES	1752 G.P.M.
HOSE STREAMS	500 G.P.M.
TOTAL (EACH BAY)	4555 G.P.M.

HEATING REQUIREMENTS*

INSIDE DESIGN TEMPERATURE	
OH SPACE	85°F
01 SPACE	68°F
OUTSIDE DESIGN TEMPERATURE	22°F
HEATING LOAD	
OH SPACE	32.660.000 BTU/HR (W/O HEAT RECOVERY)
01 SPACE	150.000 BTU/HR

AIR CONDITIONING REQUIREMENTS*

INSIDE DESIGN TEMPERATURE	76° F.D.B.
INSIDE DESIGN HUMIDITY	50%
OUTSIDE DESIGN TEMPERATURE	91° F.D.B.
	76° F.W.B.
COOLING LOAD. OFFICE	12.000 BTU/HR

ELECTRICAL REQUIREMENTS (KW)

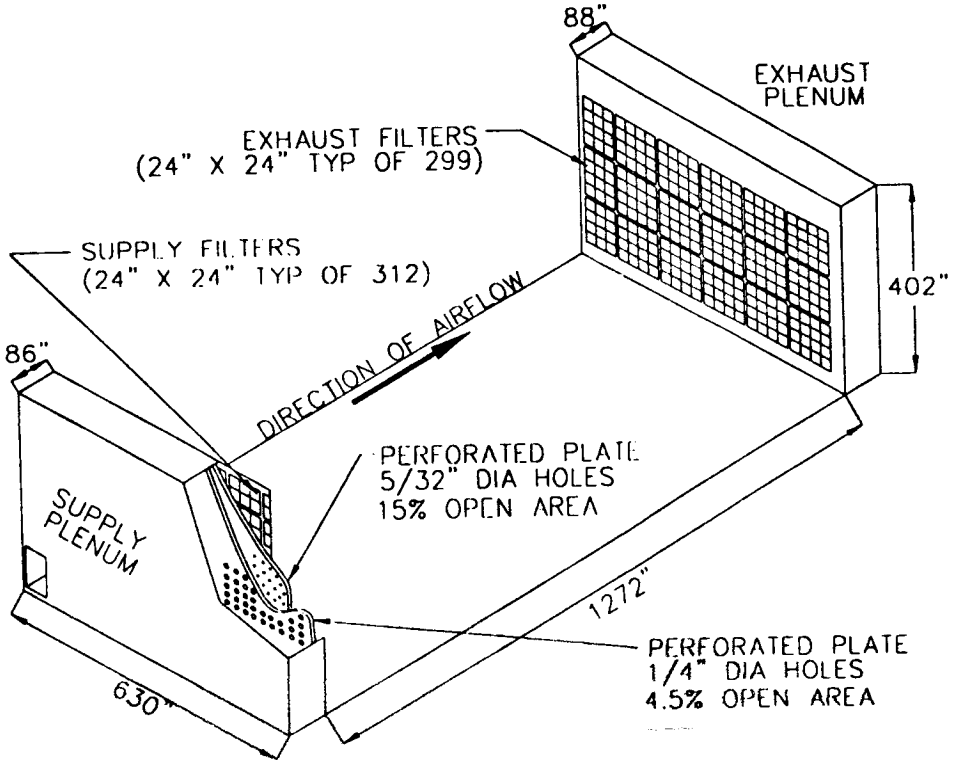
	MODULE OH SPACE	MODULE 01 SPACE
LIGHTS		
CONNECTED LOAD	55	4
POWER		
CONNECTED LOAD	898	4
TOTAL		
CONNECTED LOAD	953	8
ESTIMATED DEMAND	877	4
ADDITIONAL DEMAND FOR AIR CONDITIONING OFFICE		2

BAY DIMENSIONS

BAY DIMENSIONS SHOWN WILL SUPPORT P-3 AIRCRAFT, AND PROVIDE 10 FOOT HORIZONTAL AND 6 FOOT VERTICAL CLEARANCE BETWEEN AIRCRAFT AND HANGAR BAY WALLS/DOORS/ CEILINGS. REDUCED CLEARANCES SHALL NOT BE USED WITHOUT PRIOR NAVFAC APPROVAL.

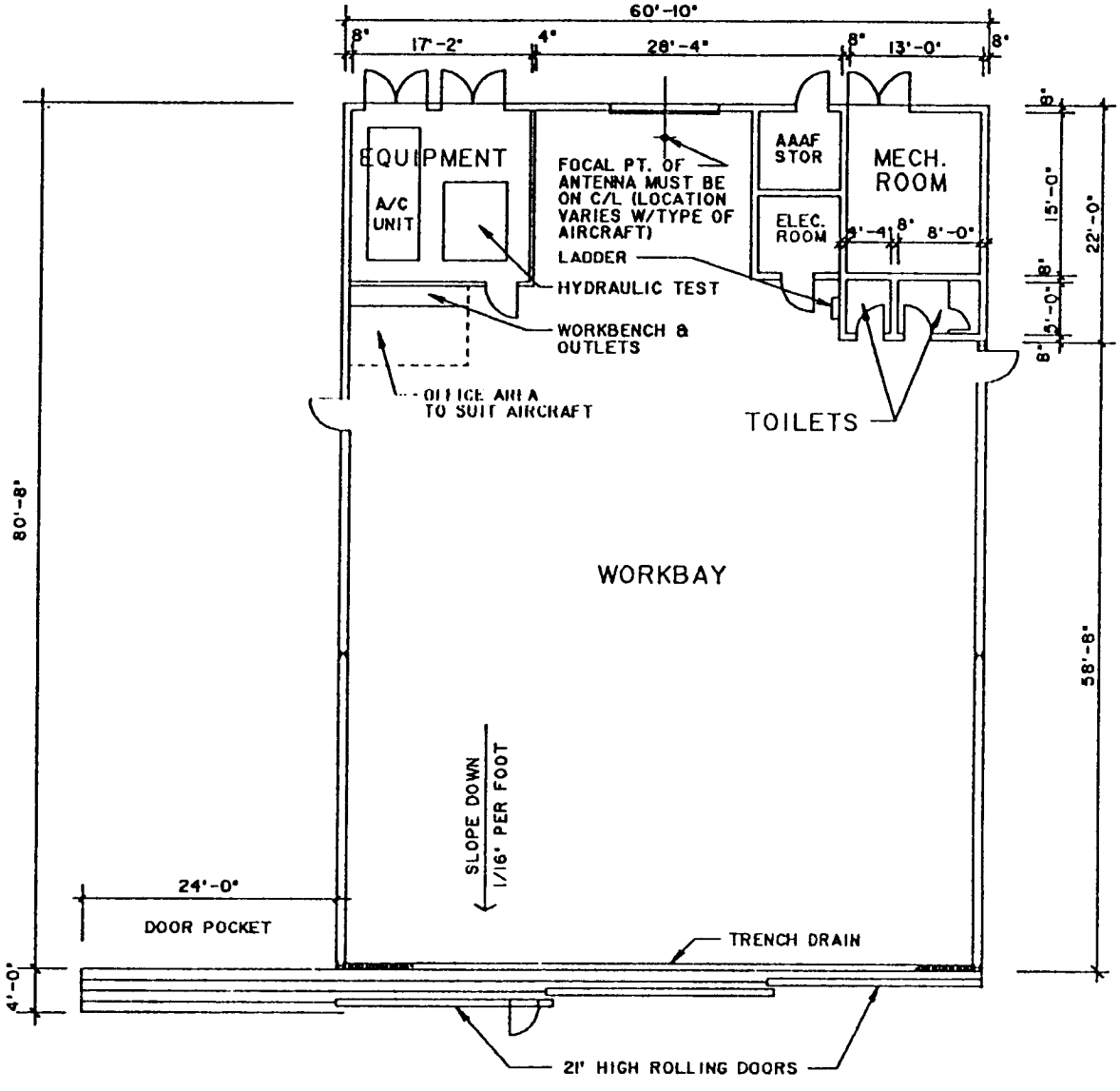
* REQUIREMENTS BASED ON NORFOLK, VIRGINIA AREA. PROVIDE COOLING FOR OFFICE SPACE ONLY. OH SPACE BAY HEATING REQUIREMENTS VARY. VERIFY SPECIFIC FACILITY REQUIREMENTS.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
CORROSION CONTROL HANGAR TYPE "B" LARGE	03/91	211-03	4 OF 5



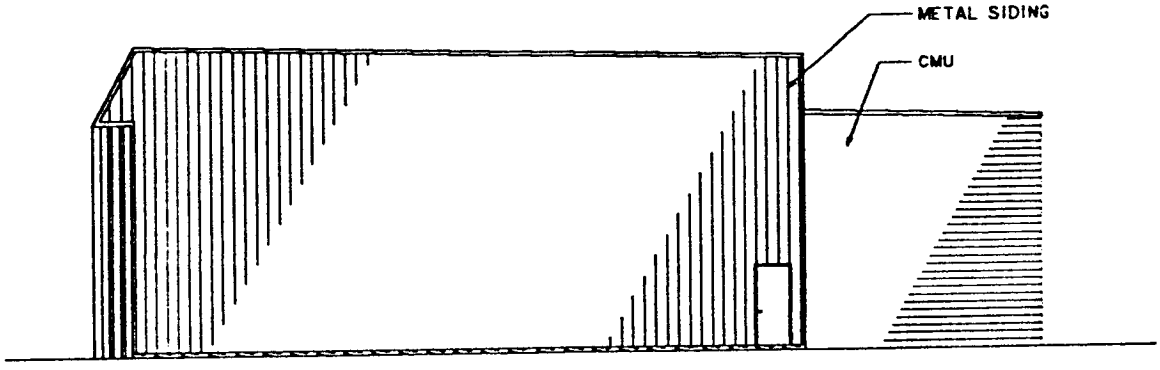
PARTIAL HANGAR BAY ISOMETRIC VIEW
WITH EXAMPLE SUPPLY PLENUM DETAILS

TITLE: CORROSION CONTROL HANGAR TYPE "B" LARGE	DATE 01/97	FACILITY PLATE NO. 211-03	SHEET 5 OF 5

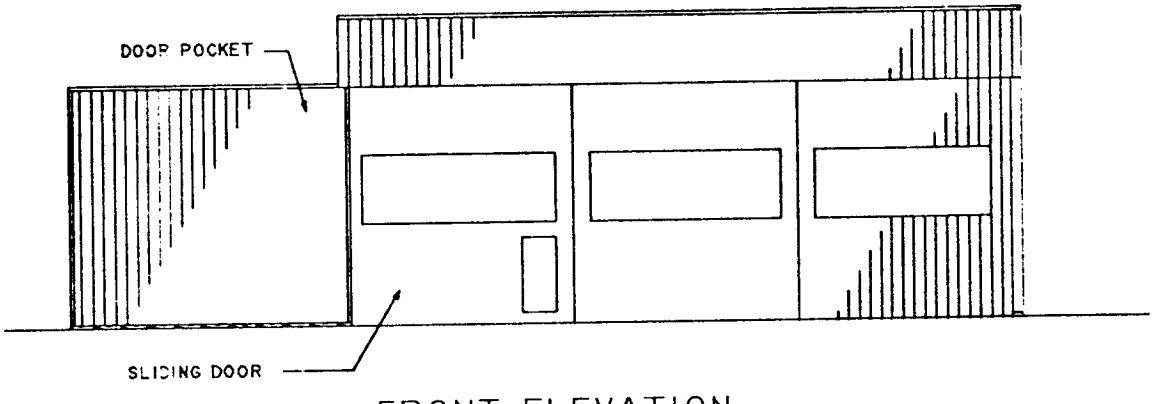


FLOOR PLAN
NOT TO SCALE

TITLE: AIRCRAFT WEAPONS ALIGNMENT FACILITY	DATE 03/91	FACILITY PLATE NO. 211-82	SHEET 1 OF 5

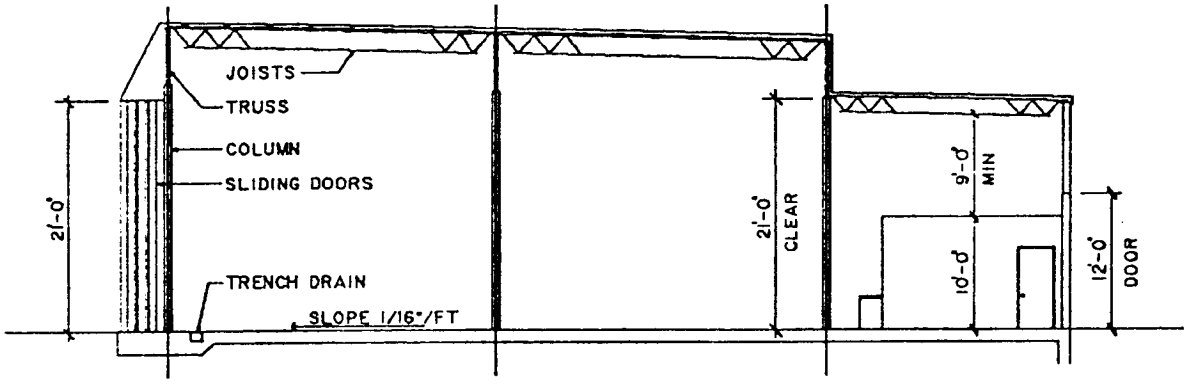


SIDE ELEVATION
NOT TO SCALE



FRONT ELEVATION
NOT TO SCALE

TITLE: AIRCRAFT WEAPONS ALIGNMENT FACILITY	DATE 03/91	FACILITY PLATE NO. 211-82	SHEET 2 OF 5



BUILDING SECTION

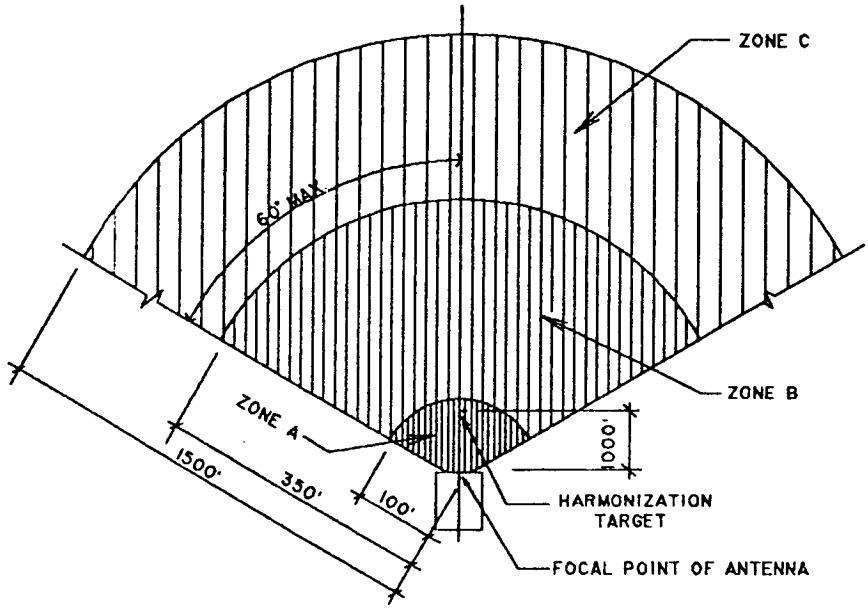
NOT TO SCALE

TITLE: AIRCRAFT WEAPONS ALIGNMENT FACILITY	DATE 03/91	FACILITY PLATE NO. 211-82	SHEET 3 OF 5

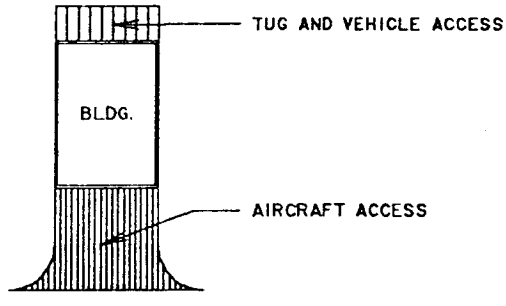
ZONE A: KEEP CLEAR OF PERSONNEL, MISSILES, FUSES, ETC., BUILDINGS MOTOR VEHICLES, AIRCRAFT & OTHER RADAR REFLECTIVE OBJECTS AND DISASSEMBLED ELECTRO-EXPLOSIVE DEVICES.

ZONE B: KEEP CLEAR OF MISSILES, FUSES, ETC., BUILDINGS, MOTOR VEHICLES, AIRCRAFT & OTHER RADAR REFLECTIVE OBJECTS AND DISASSEMBLED ELECTRO-EXPLOSIVE DEVICES.

ZONE C: KEEP CLEAR OF DISASSEMBLED ELECTRO-EXPLOSIVE DEVICES.



PLOT PLAN
NOT TO SCALE



TYPICAL SITE PLAN
NOT TO SCALE

TITLE: AIRCRAFT WEAPONS ALIGNMENT FACILITY	DATE 03/91	FACILITY PLATE NO. 211-82	SHEET 4 OF 5

NOTES

PLUMBING REQUIREMENTS

COLD WATER	45 GPM
HOT WATER	
RECOVERY RATE (100°RISE)	18 GPH
STORAGE	18 GAL

THE ABOVE RATES DO NOT INCLUDE REQUIREMENTS FOR FIRE PROTECTION

HEATING REQUIREMENTS (MBTU/HR)

OUTSIDE DESIGN TEMPERATURE

-5 F°	+5 F°	+15 F°	+25 F°
160	137	114	91

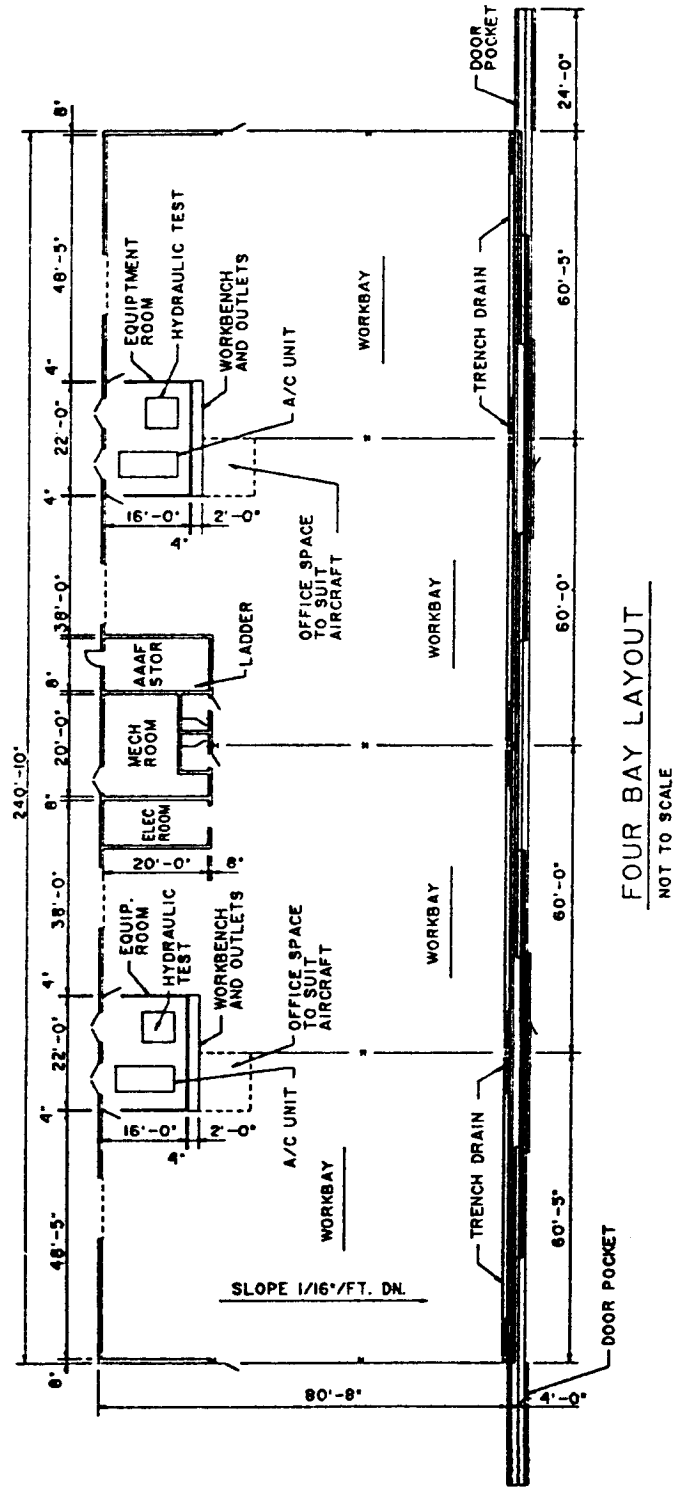
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	18.4
ESTIMATED DEMAND	14.2
POWER	
CONNECTED LOAD	120.0
ESTIMATED DEMAND	96.0
TOTAL	
CONNECTED LOAD	138.4
ESTIMATED DEMAND	110.2

AREAS

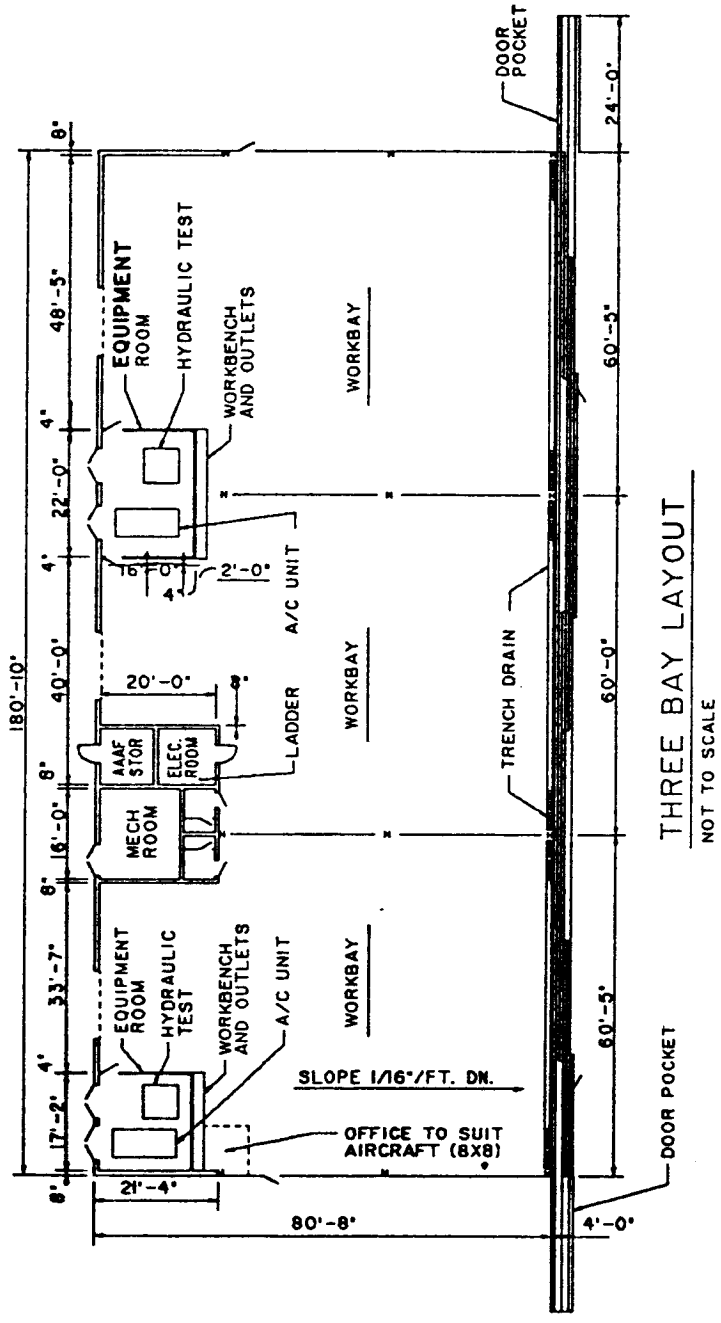
GROSS AREA INCLUDING MECHANICAL ROOM AND EQUIPMENT ROOM	5,246 SF

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AIRCRAFT WEAPONS ALIGNMENT FACILITY	03/91	211-82	5 OF 5



FOUR BAY LAYOUT
NOT TO SCALE

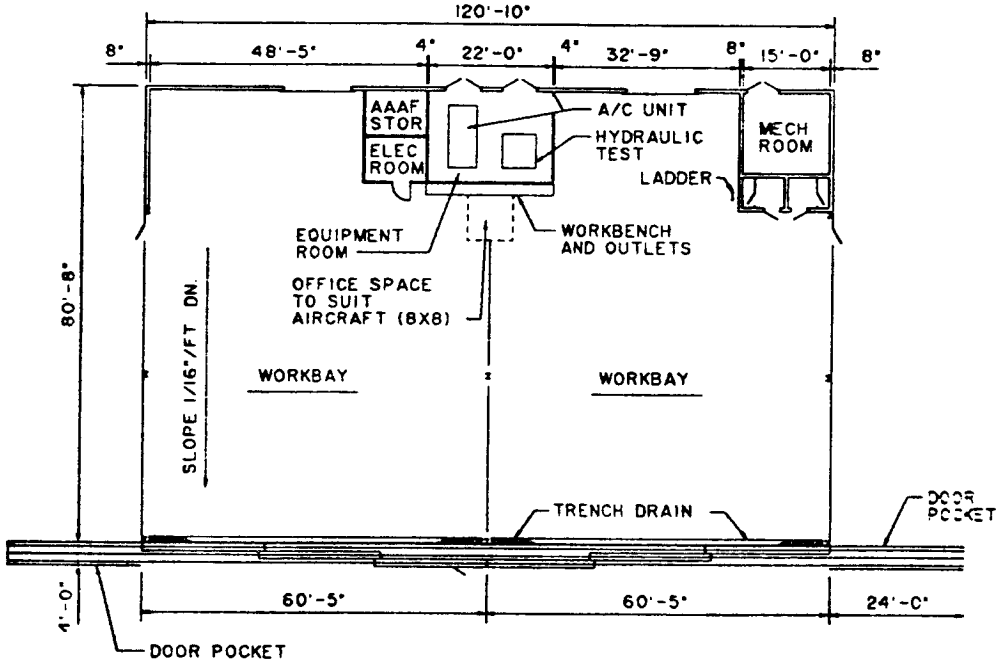
TITLE: AIRCRAFT WEAPONS ALIGNMENT FACILITY	DATE 03/91	FACILITY PLATE NO. 211-82	SHEET 1 OF 6



THREE BAY LAYOUT

NOT TO SCALE

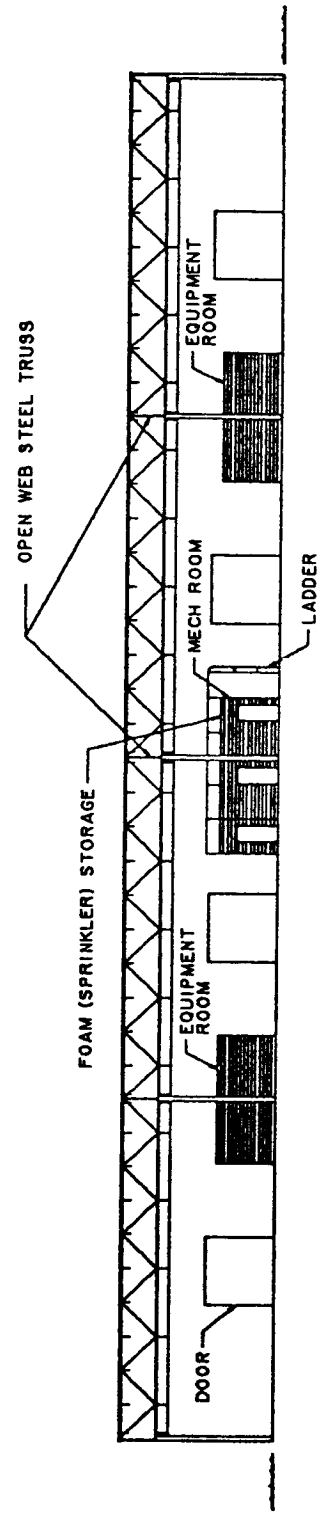
TITLE: AIRCRAFT WEAPONS ALIGNMENT FACILITY	DATE 03/91	FACILITY PLATE NO. 211-82	SHEET 2 OF 6



TWO BAY LAYOUT

NOT TO SCALE

TITLE: AIRCRAFT WEAPONS ALIGNMENT FACILITY	DATE 03/91	FACILITY PLATE NO. 211-82	SHEET 3 OF 6



LONGITUDINAL SECTION A-A (4 BAYS)

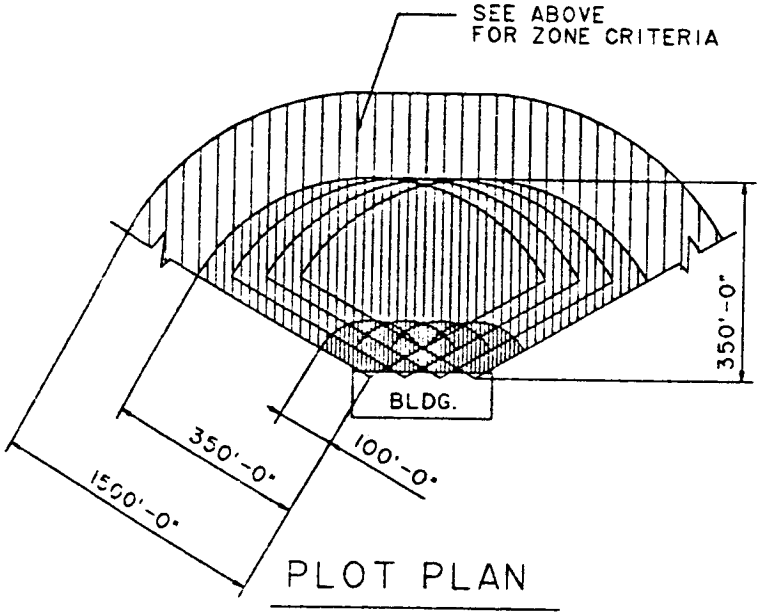
NOT TO SCALE

TITLE: AIRCRAFT WEAPONS ALIGNMENT FACILITY	DATE 03/91	FACILITY PLATE NO. 211-82	SHEET 4 OF 6

ZONE A: KEEP CLEAR OF PERSONNEL, MISSILES, FUSES, ETC., BUILDINGS MOTOR VEHICLES, AIRCRAFT & OTHER RADAR REFLECTIVE OBJECTS AND DISASSEMBLED ELECTRO-EXPLOSIVE DEVICES.

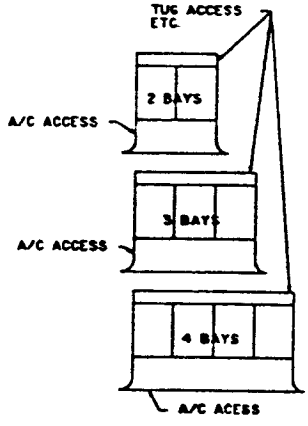
ZONE B: KEEP CLEAR OF MISSILES, FUSES, ETC., BUILDINGS, MOTOR VEHICLES, AIRCRAFT & OTHER RADAR REFLECTIVE OBJECTS AND DISASSEMBLED ELECTRO-EXPLOSIVE DEVICES.

ZONE C: KEEP CLEAR OF DISASSEMBLED ELECTRO-EXPLOSIVE DEVICES.



PLOT PLAN

NOT TO SCALE



TYPICAL
SITE PLANS

SCALE NONE

TITLE:	AIRCRAFT WEAPONS ALIGNMENT FACILITY	DATE 03/91	FACILITY PLATE NO. 211-82	SHEET 5 OF 6

NOTES

PLUMBING REQUIREMENTS

COLD WATER	30 GPM
HOT WATER	
RECOVERY RATE (100°RISE)	30 GPH
STORAGE	30 GAL

THE ABOVE RATES DO NOT INCLUDE REQUIREMENTS FOR FIRE PROTECTION

HEATING REQUIREMENTS (MBTU/HR)

INSIDE DESIGN TEMPERATURE 70°F

OUTSIDE DESIGN TEMPERATURE

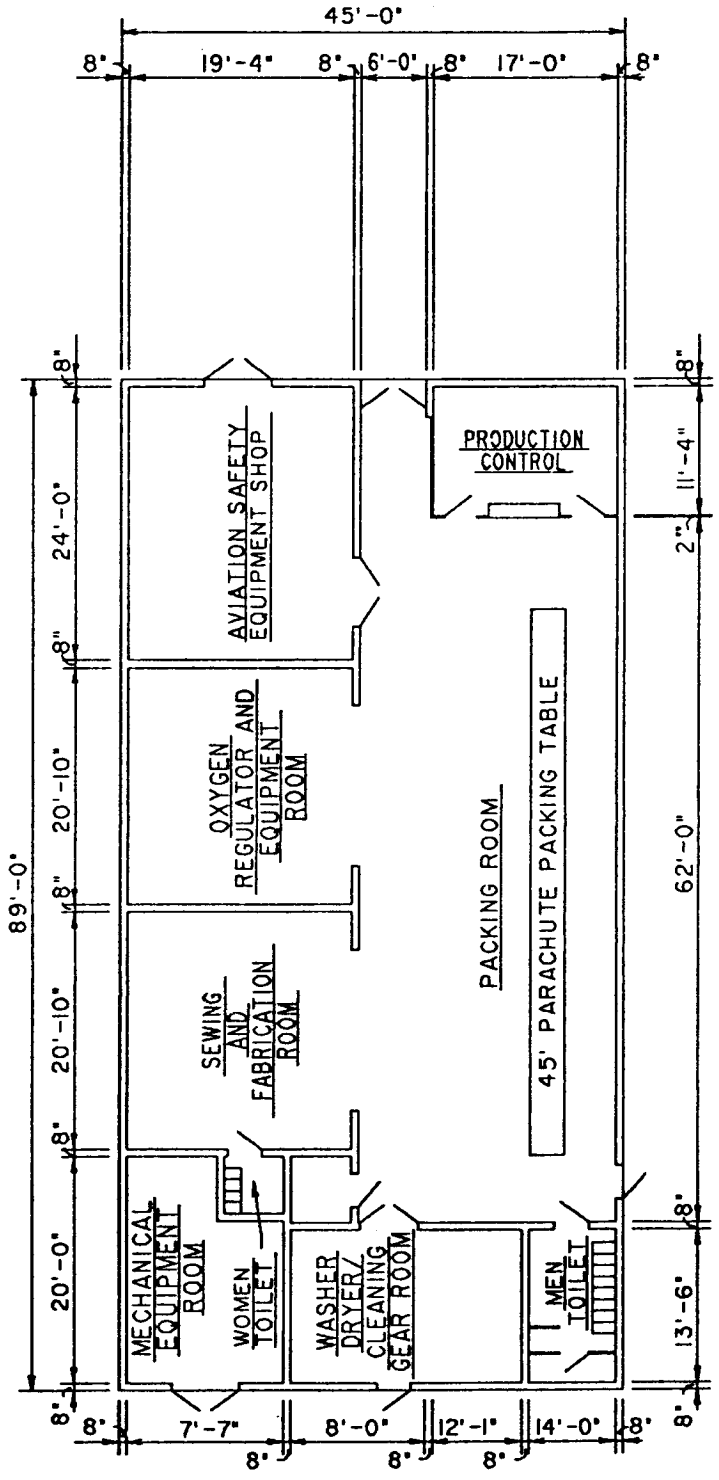
	-5 F°	+5 F°	+15 F°	+25 F°
2 BAYS	702	605	516	426
3 BAYS	1050	906	772	631
4 BAYS	1400	1207	1057	840

ELECTRICAL REQUIREMENTS (KW)

	2 BAYS	3 BAYS	4 BAYS
LIGHTS			
CONNECTED LOAD	36.5	54.6	72.7
ESTIMATED DEMAND	28.4	42.4	56.5
POWER			
CONNECTED LOAD	230.0	330.0	420.0
ESTIMATED DEMAND	184.0	264.0	336.0
TOTAL			
CONNECTED LOAD	266.5	384.6	492.7
ESTIMATED DEMAND	212.4	306.4	392.5

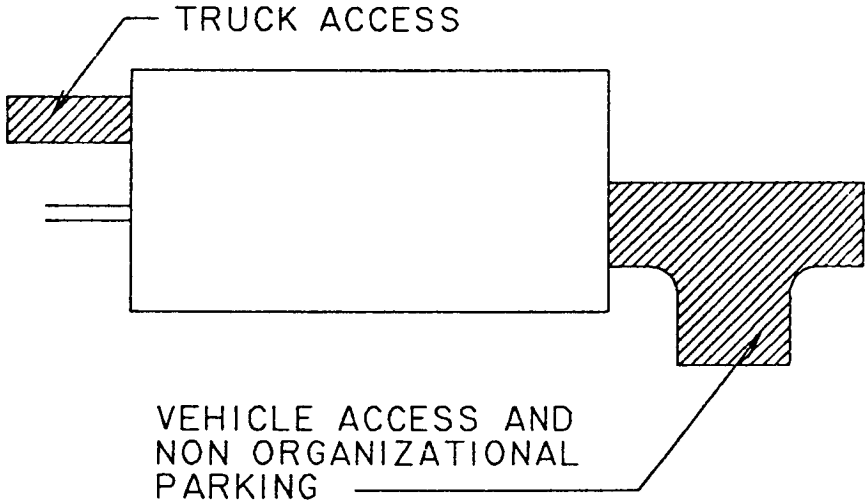
AREAS	2 BAYS	3 BAYS	4 BAYS
GROSS AREA INCLUDING MECHANICAL ROOM AND EQUIPMENT ROOM	10,423 SF	15,503 SF	20,583 SF

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AIRCRAFT WEAPONS ALIGNMENT FACILITY	03/91	211-82	6 OF 6



FLOOR PLAN
NOT TO SCALE

TITLE: AVIATION LIFE SUPPORT SYSTEMS SHOP	DATE 03/91	FACILITY PLATE NO. 211-75	SHEET 1 OF 3



TYPICAL SITE PLAN

NOT TO SCALE

TITLE:	AVIATION LIFE SUPPORT SYSTEMS SHOP	DATE 03/91	FACILITY PLATE NO. 211-75	SHEET 2 OF 3

NOTES

PLUMBING REQUIREMENTS

COLD WATER	100 G.P.M.
HOT WATER	
RECOVERY RATE (100° RISE)	50 G.P.H.
STORAGE	70 GAL.

THE ABOVE RATES DO NOT INCLUDE REQUIREMENTS FOR FIRE PROTECTION

HEATING REQUIREMENTS (MBTU/HR)

OUTSIDE DESIGN TEMPERATURE

-5° F	+5° F	+15° F	+25° F
255	220	185	150

AIR CONDITIONING REQUIREMENTS

COOLING LOAD (MBTU/HR)	246

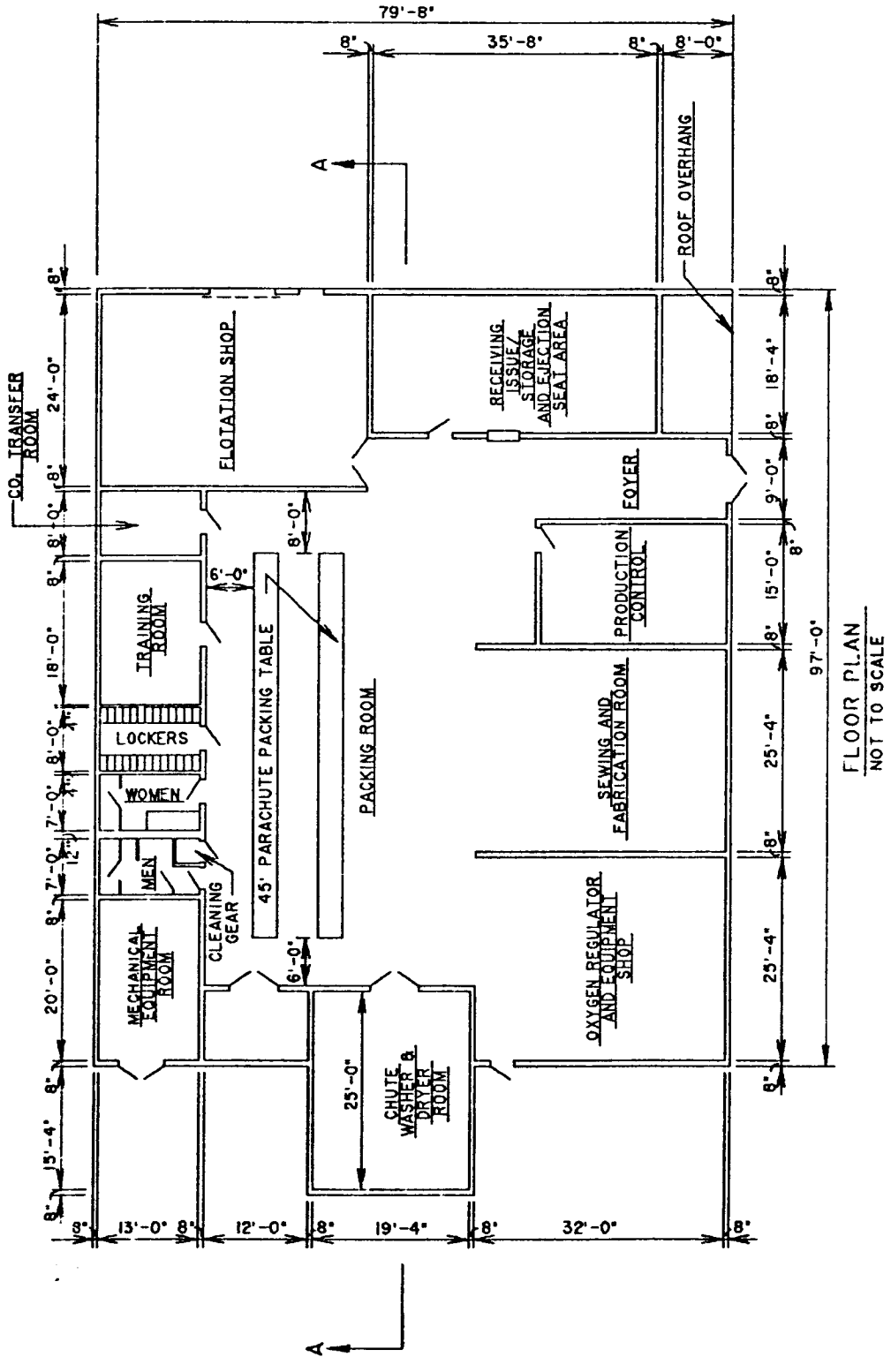
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	15.0
ESTIMATED DEMAND	12.0
POWER	
CONNECTED LOAD	12.5
ESTIMATED DEMAND	10.0
TOTAL	
CONNECTED LOAD	27.5
ESTIMATED DEMAND	22.0
ADDITIONAL DEMAND FOR AIR CONDITIONING	20.5

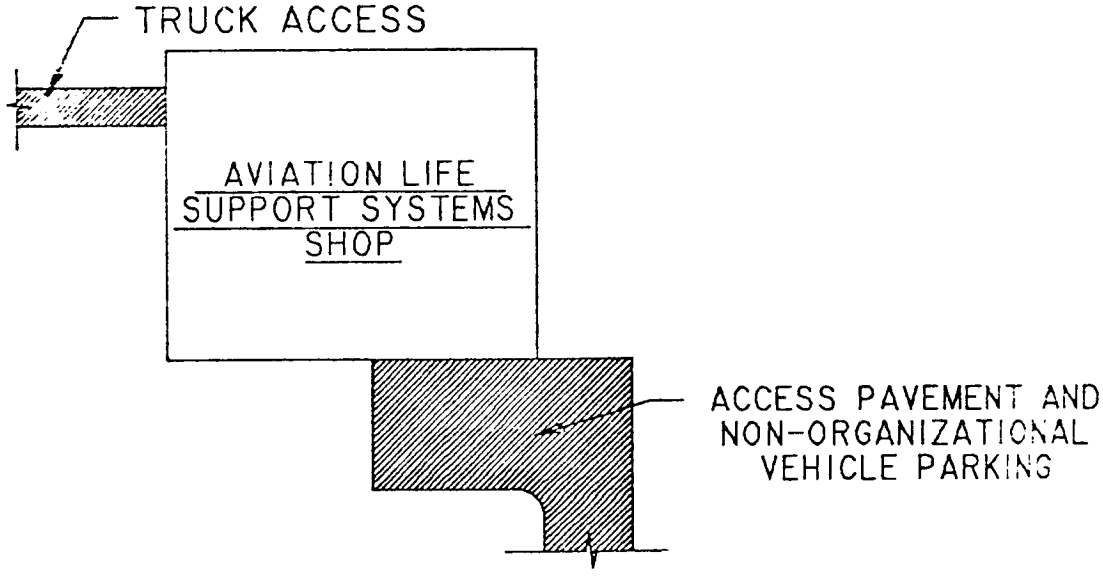
AREAS

GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM	4,000 S.F.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIATION LIFE SUPPORT SYSTEMS SHOP	03/91	211-75	3 OF 3



TITLE: AVIATION LIFE SUPPORT SYSTEMS SHOP	DATE 03/91	FACILITY PLATE NO. 211-75	SHEET 1 OF 3



TYPICAL SITE PLAN

NOT TO SCALE

TITLE:	AVIATION LIFE SUPPORT SYSTEMS SHOP	DATE 03/91	FACILITY PLATE NO. 211-75	SHEET 2 OF 3

NOTES

PLUMBING REQUIREMENTS

COLD WATER	100 G.P.M.
HOT WATER	
RECOVERY RATE (100° RISE)	70 G.P.H.
STORAGE	90 GAL.

THE ABOVE RATES DO NOT INCLUDE REQUIREMENTS FOR FIRE PROTECTION

HEATING REQUIREMENTS (MBTU/HR)

OUTSIDE DESIGN TEMPERATURE

-5° F	+5° F	+15° F	+25° F
305	261	219	178

AIR CONDITIONING REQUIREMENTS

COOLING LOAD (MBTU/HR)	336

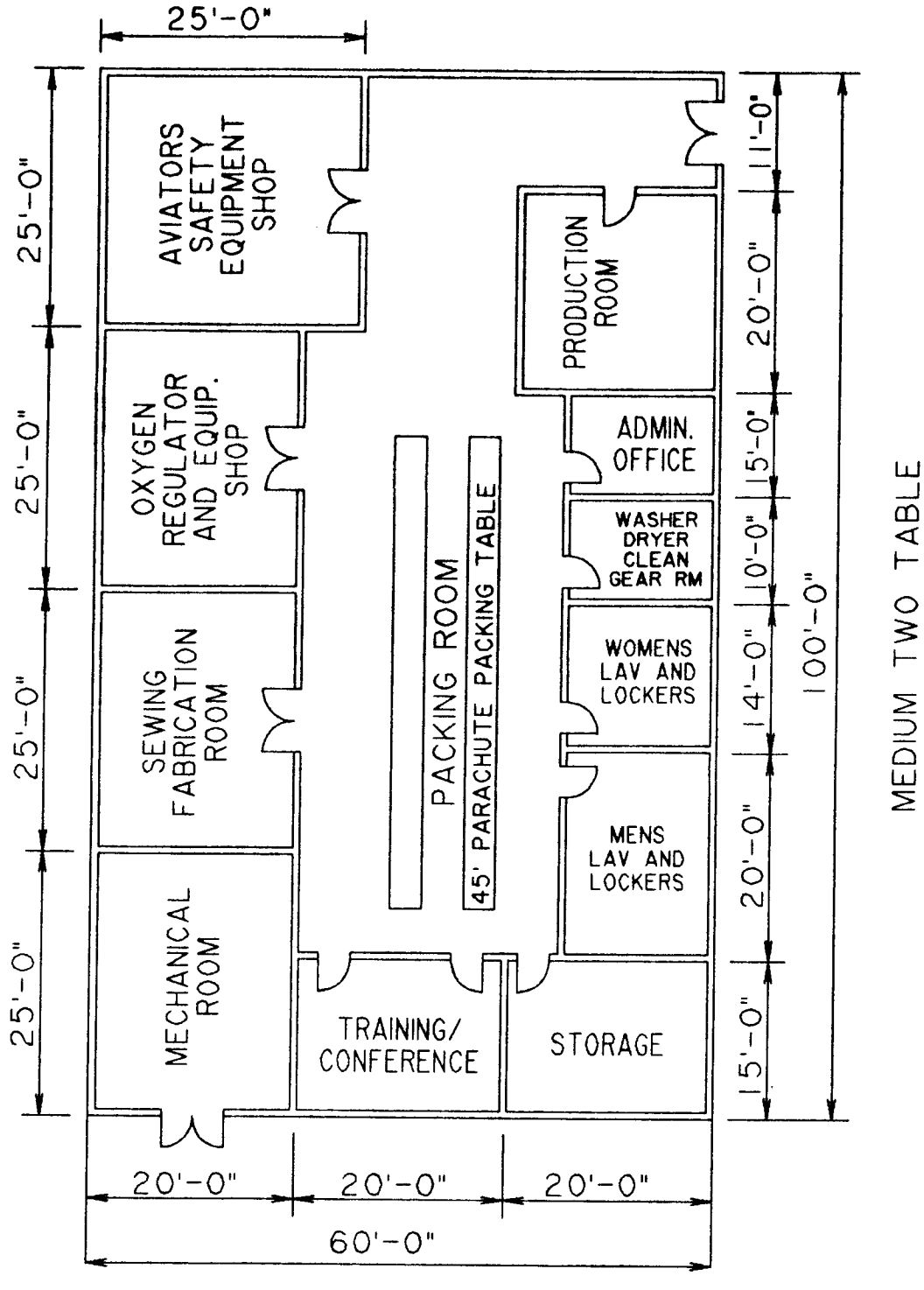
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	17.6
ESTIMATED DEMAND	14.2
POWER	
CONNECTED LOAD	14.8
ESTIMATED DEMAND	11.9
TOTAL	
CONNECTED LOAD	32.6
ESTIMATED DEMAND	26.1
ADDITIONAL DEMAND FOR AIR CONDITIONING	28.0

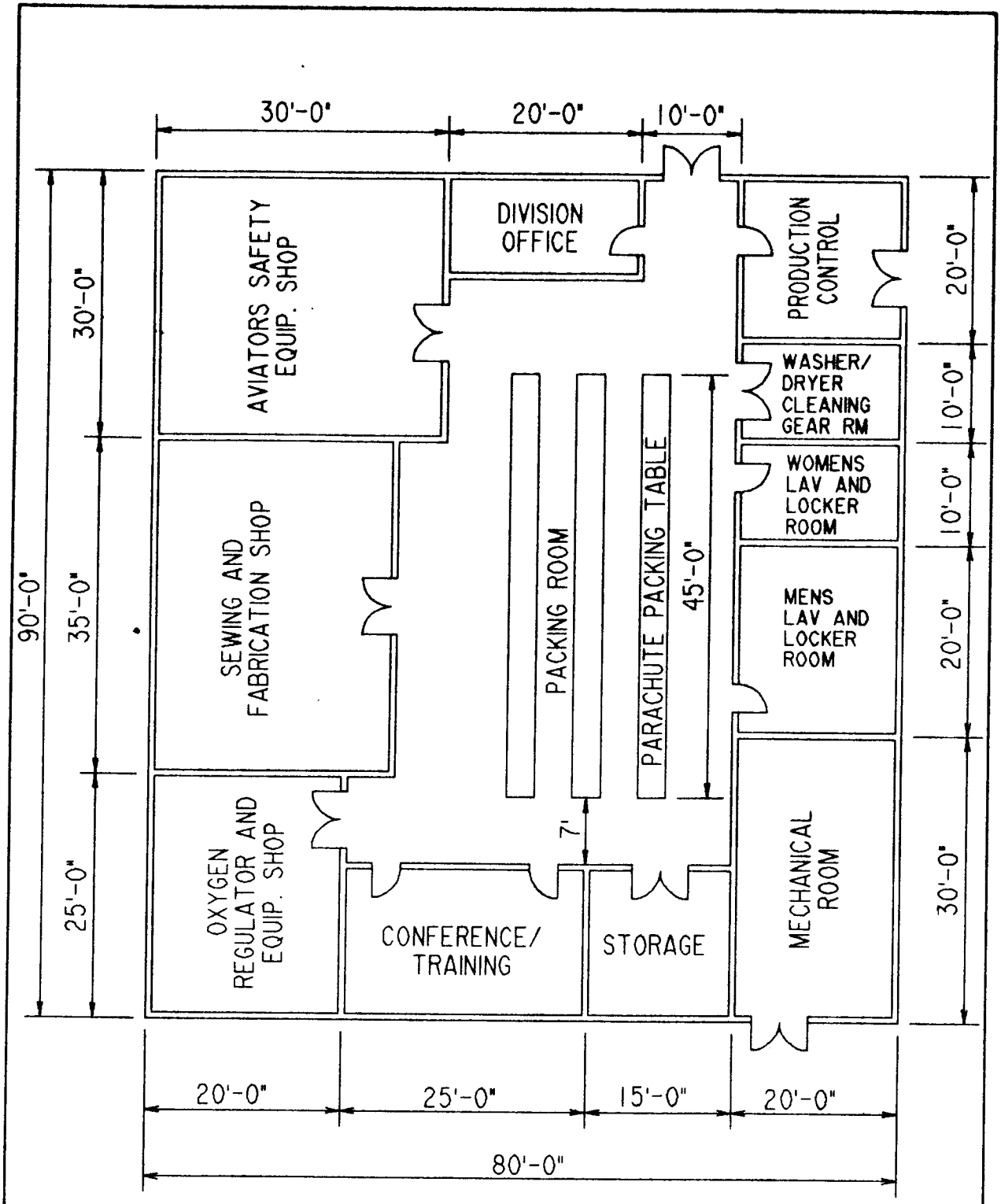
AREAS

GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM	7,800 S.F.

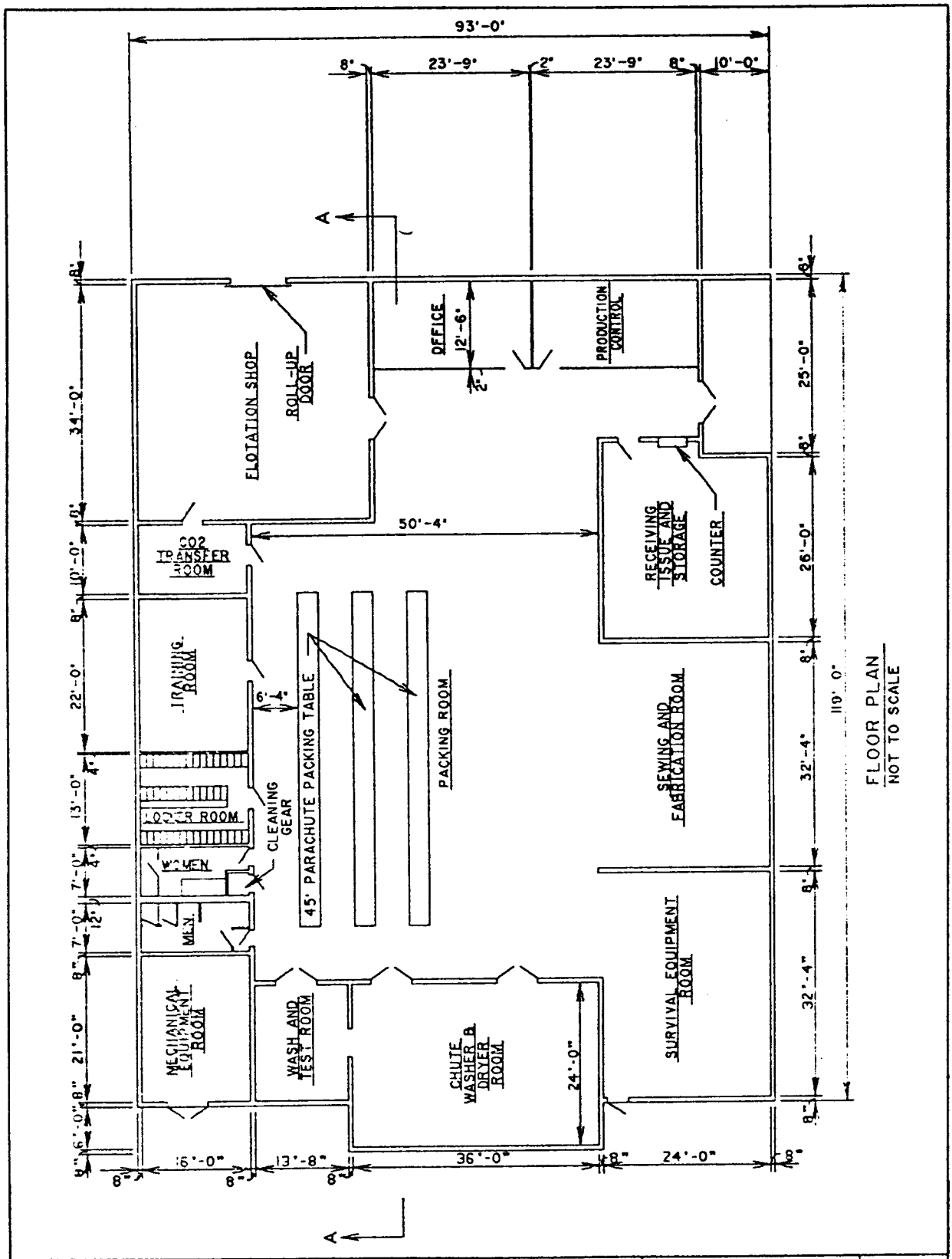
TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIATION LIFE SUPPORT SYSTEMS SHOP	03/91	211-75	3 OF 3



TITLE: AVIATION LIFE SUPPORT SYSTEMS SHOP	DATE 03/91	FACILITY PLATE NO. 211-75	SHEET 1 OF 1

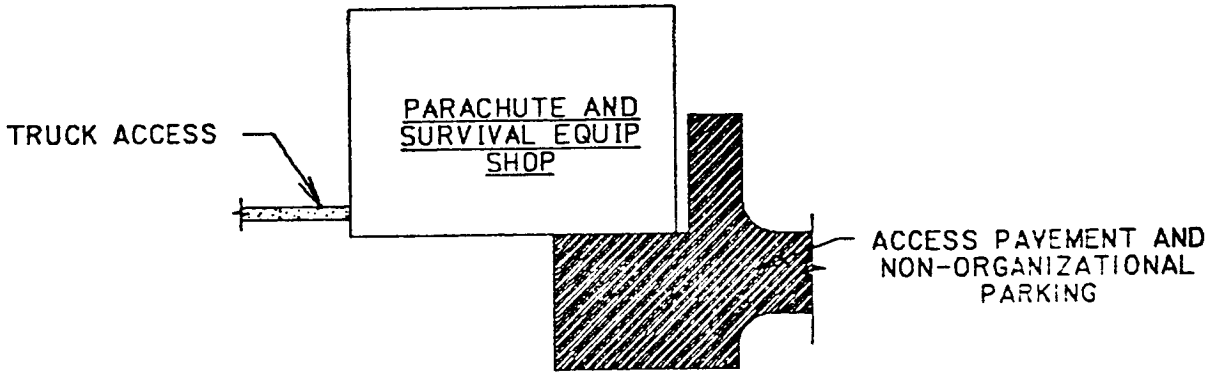


TITLE: AVIATION LIFE SUPPORT SYSTEMS SHOP	DATE 03/91	FACILITY PLATE NO. 211-75	SHEET 1 OF 1



FLOOR PLAN
NOT TO SCALE

TITLE: AVIATION LIFE SUPPORT SYSTEMS SHOP - LARGE	DATE 03/91	FACILITY PLATE NO. 211-75	SHEET 1 OF 3



TYPICAL SITE PLAN
NOT TO SCALE

TITLE:	AVIATION LIFE SUPPORT SYSTEMS SHOP - LARGE	DATE 03/91	FACILITY PLATE NO. 211-75	SHEET 2 OF 3

NOTES

PLUMBING REQUIREMENTS

COLD WATER	30 G.P.M.
HOT WATER	
RECOVERY RATE (100° RISE)	75 G.P.H.
STORAGE	110 GAL.

THE ABOVE RATES DO NOT INCLUDE REQUIREMENTS FOR FIRE PROTECTION

HEATING REQUIREMENTS (MBTU/HR)

OUTSIDE DESIGN TEMPERATURE

-5° F	+5° F	+15° F	+25° F
589	508	427	347

AIR CONDITIONING REQUIREMENTS

COOLING LOAD (MBTU/HR)	504

ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	34.6
ESTIMATED DEMAND	27.7
POWER	
CONNECTED LOAD	28.9
ESTIMATED DEMAND	23.1
TOTAL	
CONNECTED LOAD	63.5
ESTIMATED DEMAND	50.8
ADDITIONAL DEMAND FOR AIR CONDITIONING	42.0

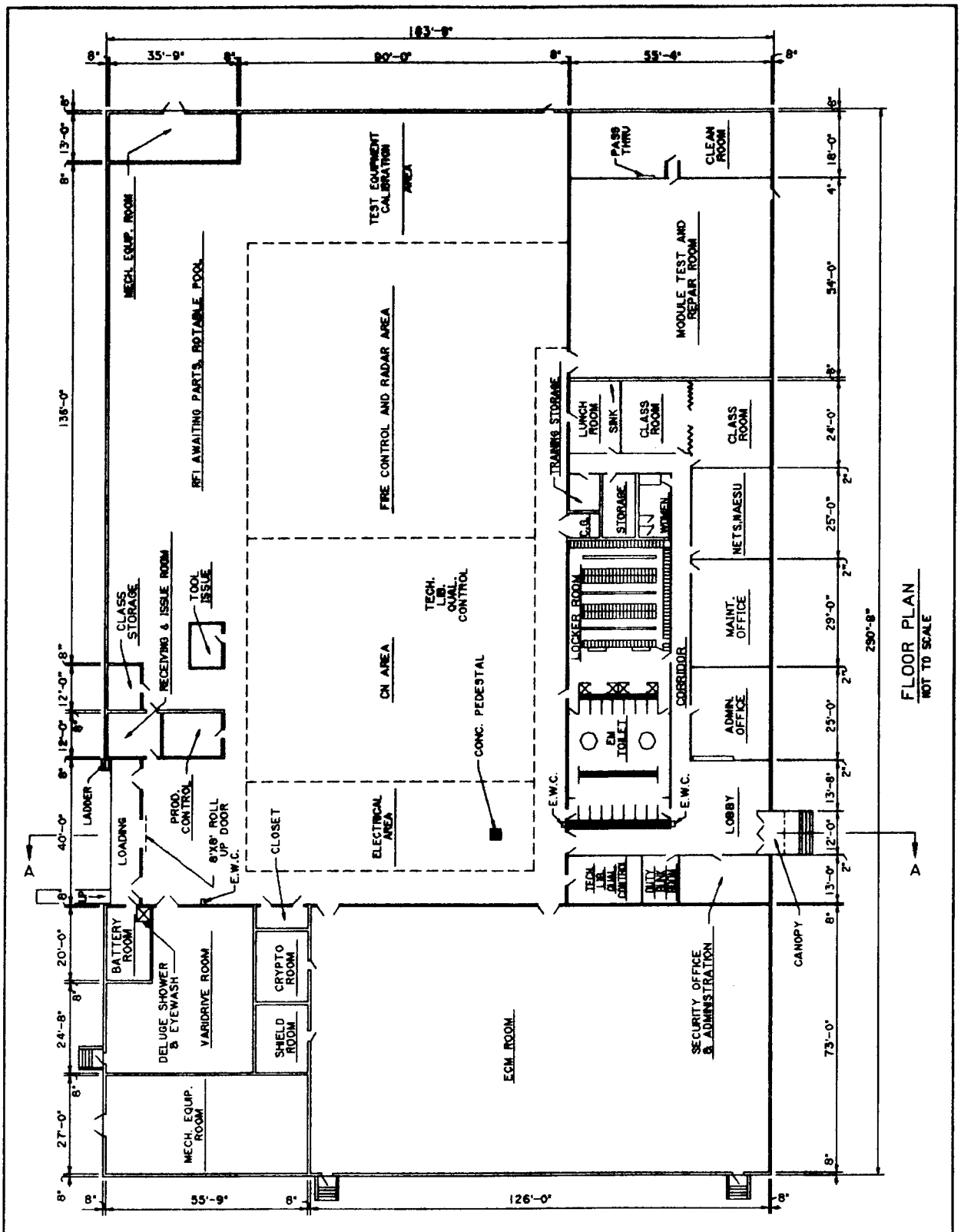
AREAS

GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM	11,200 S.F.

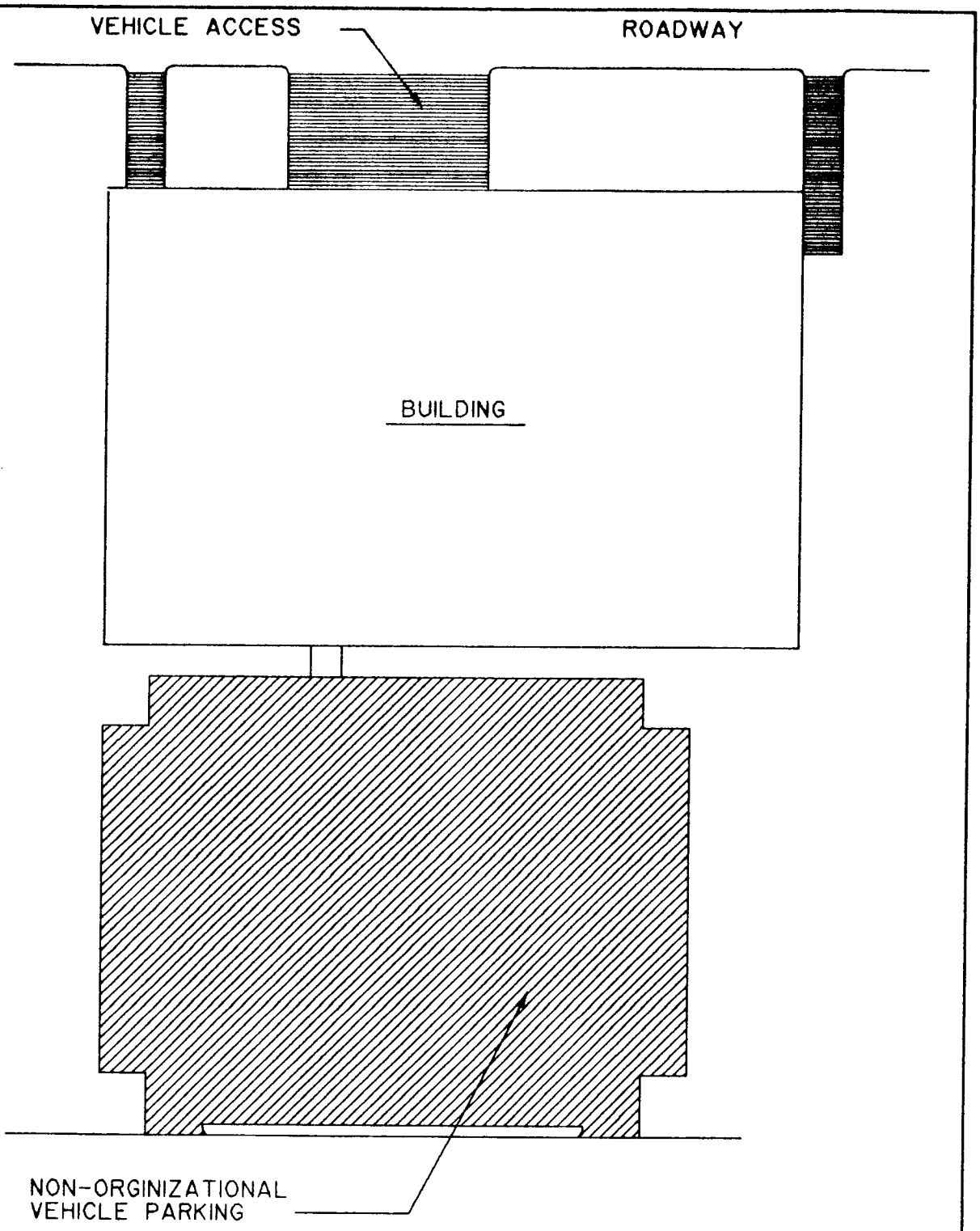
GENERAL NOTES:

RELOCATABLE PARTITIONS ARE DESIGNATED AS 2" PARTITIONS. ACTUAL DIMENSIONS WILL BE A FUNCTION OF DESIGN.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIATION LIFE SUPPORT SYSTEMS SHOP - LARGE	03/91	211-75	3 OF 3



TITLE: AVIONICS SHOP VF	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 1 OF 3



TYPICAL SITE PLAN

NOT TO SCALE

TITLE: AVIONICS SHOP VF	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 2 OF 3

NOTES

PLUMBING REQUIREMENTS

COLD WATER 76 G.P.M.

HOT WATER

RECOVERY RATE (100° RISE) 75 G.P.H.

STORAGE 75 G.P.H.

FIRE PROTECTION REQUIREMENTS NOT INCLUDED

HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE

-5 °F	+5°F	+15°F	+25°F
210	180	150	120

AIR CONDITIONING REQUIREMENTS

BASED ON 91° F D.B. 76°F WB OUTSIDE DESIGN CONDITIONS

COOLING LOAD (MBTU/HR)

SEE DM-28 FOR SPACES REQUIRING AIR CONDITIONING

ELECTRICAL REQUIREMENTS (KW)

LIGHTS

CONNECTED LOAD 170.9

ESTIMATED DEMAND 160.2

POWER

CONNECTED LOAD 1228.2

ESTIMATED DEMAND 736.9

TOTAL

CONNECTED LOAD 1399.1

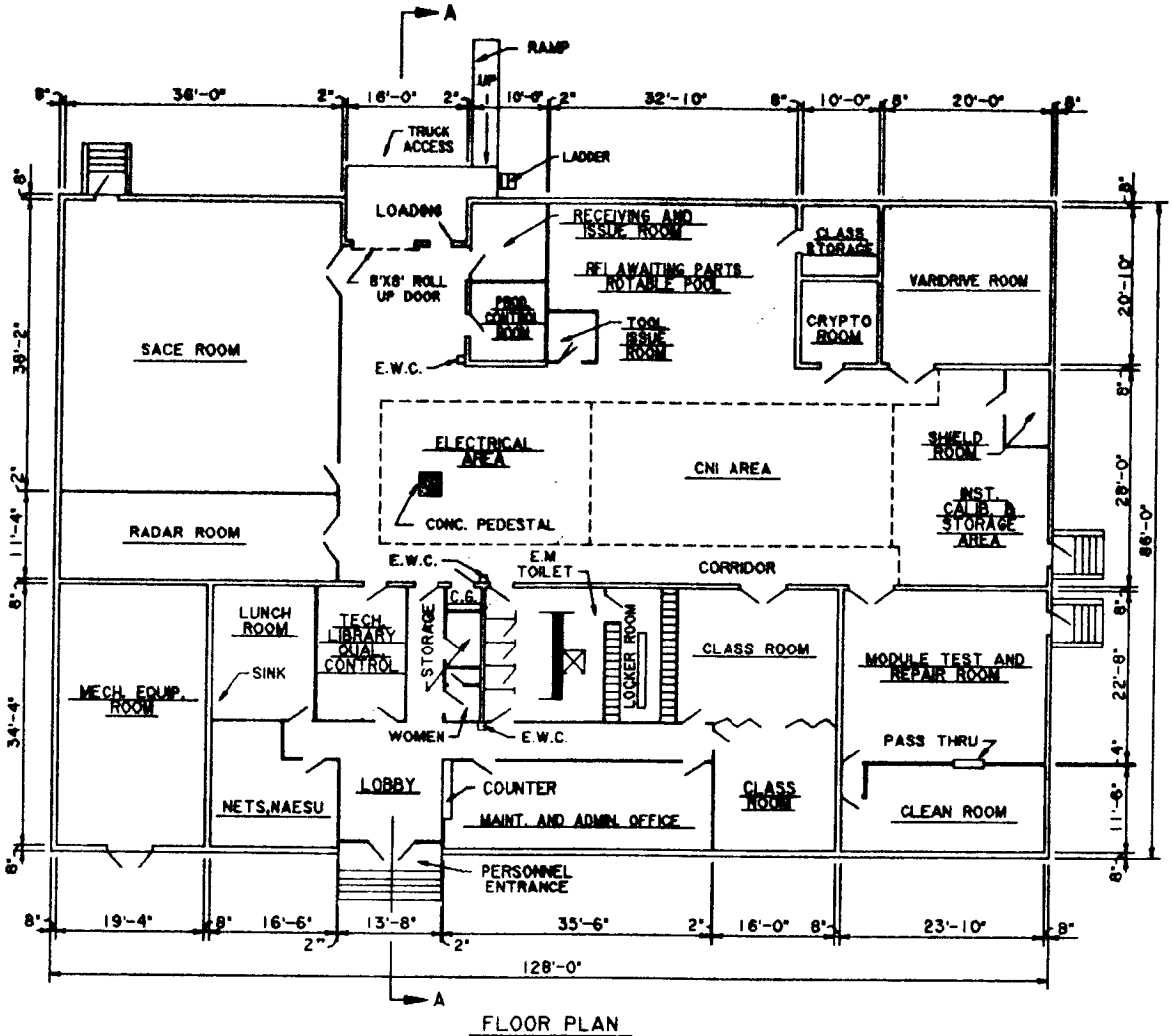
ESTIMATED DEMAND 897.1

AIR CONDITIONING TO BE DETERMINED

AREAS

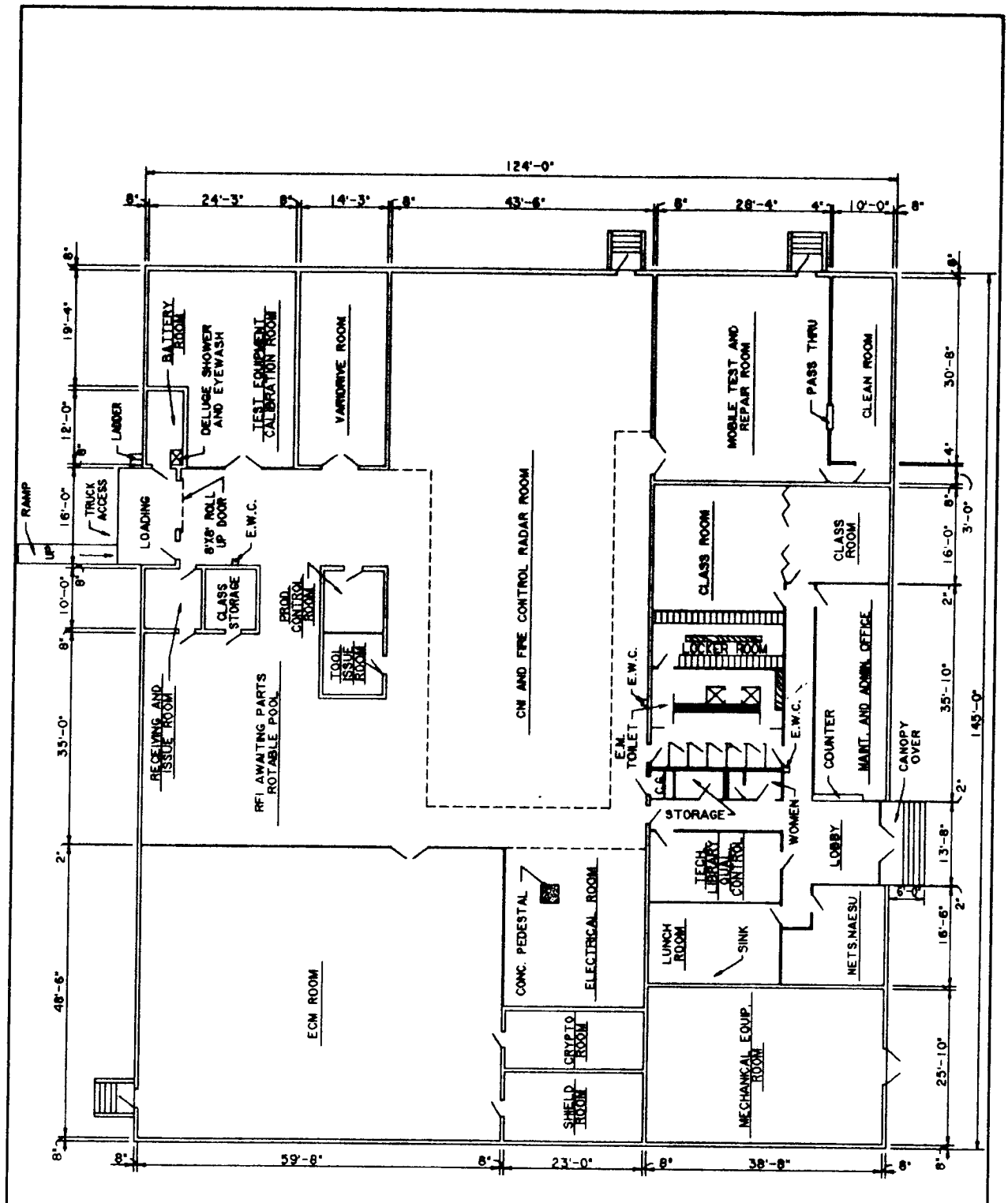
GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM 53,400 S.F.

TITLE: AVIONICS SHOP VF	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 3 OF 3



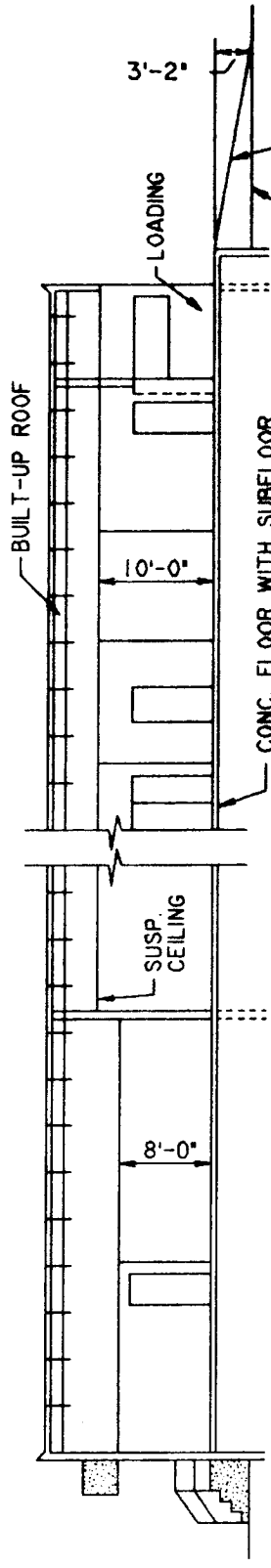
FLOOR PLAN
NOT TO SCALE

TITLE: AVIONICS SHOP VW	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 1 OF 4



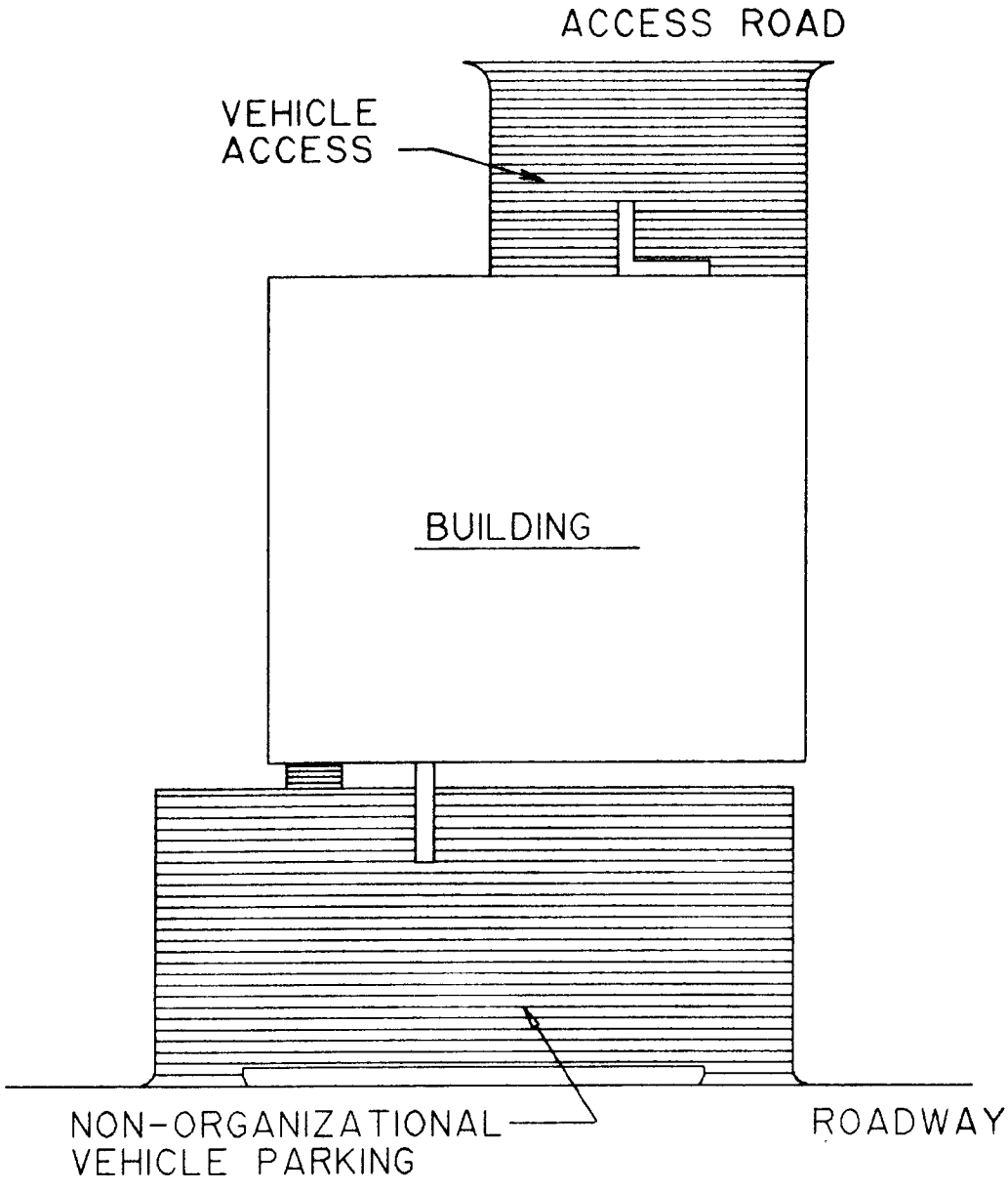
FLOOR PLAN
NOT TO SCALE

TITLE: AVIONICS SHOP VF	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 1 OF 4



SECTION A
NOT TO SCALE

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VF	03/91	211-45	2 OF 4



TYPICAL SITE PLAN

NOT TO SCALE

TITLE: AVIONICS SHOP VF	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 3 OF 4

NOTES

PLUMBING REQUIREMENTS

WATER	
COLD	76 G.P.M.
HOT	
RECOVERY RATE (100°RISE)	75 G.P.H.
STORAGE	75 G.P.H.

FIRE PROTECTION REQUIREMENTS NOT INCLUDED

HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE

-5°F	+5°F	+15°F	+25°F
295	253	211	169

AIR CONDITIONING REQUIREMENTS

BASED ON 91°F D.B. 76°F WB OUTSIDE DESIGN CONDITIONS

COOLING LOAD (MBH)	297

HEAT REJECTED TO CONDITIONED SPACES BY ENERGIZED TEST

EQUIPMENT AND PARTS UNDER REPAIR NOT INCLUDED

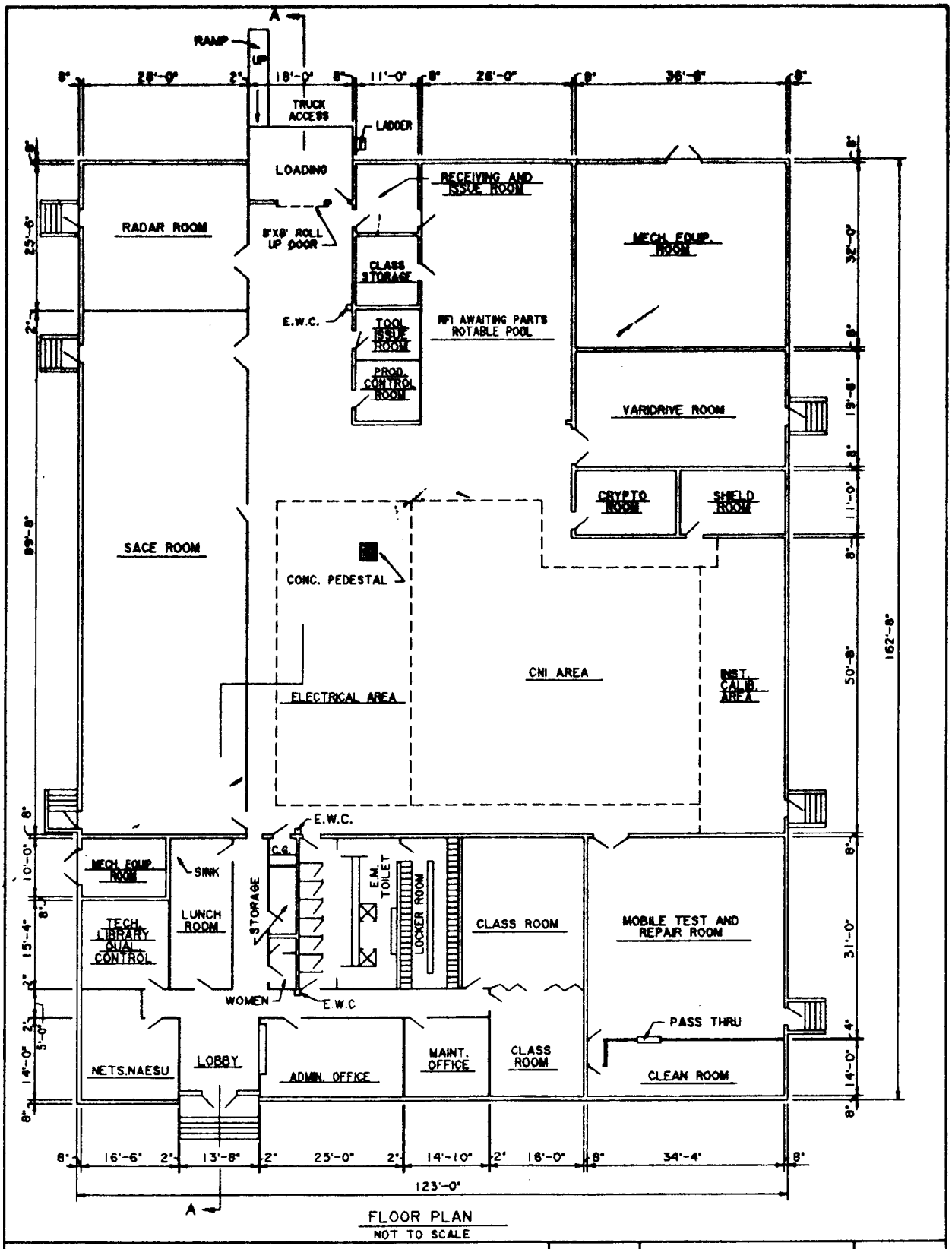
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	57.6
ESTIMATED DEMAND	54.0
POWER	
CONNECTED LOAD	414.0
ESTIMATED DEMAND	248.4
TOTAL	
CONNECTED LOAD	471.6
ESTIMATED DEMAND	302.4
AIR CONDITIONING	32.1

AREAS

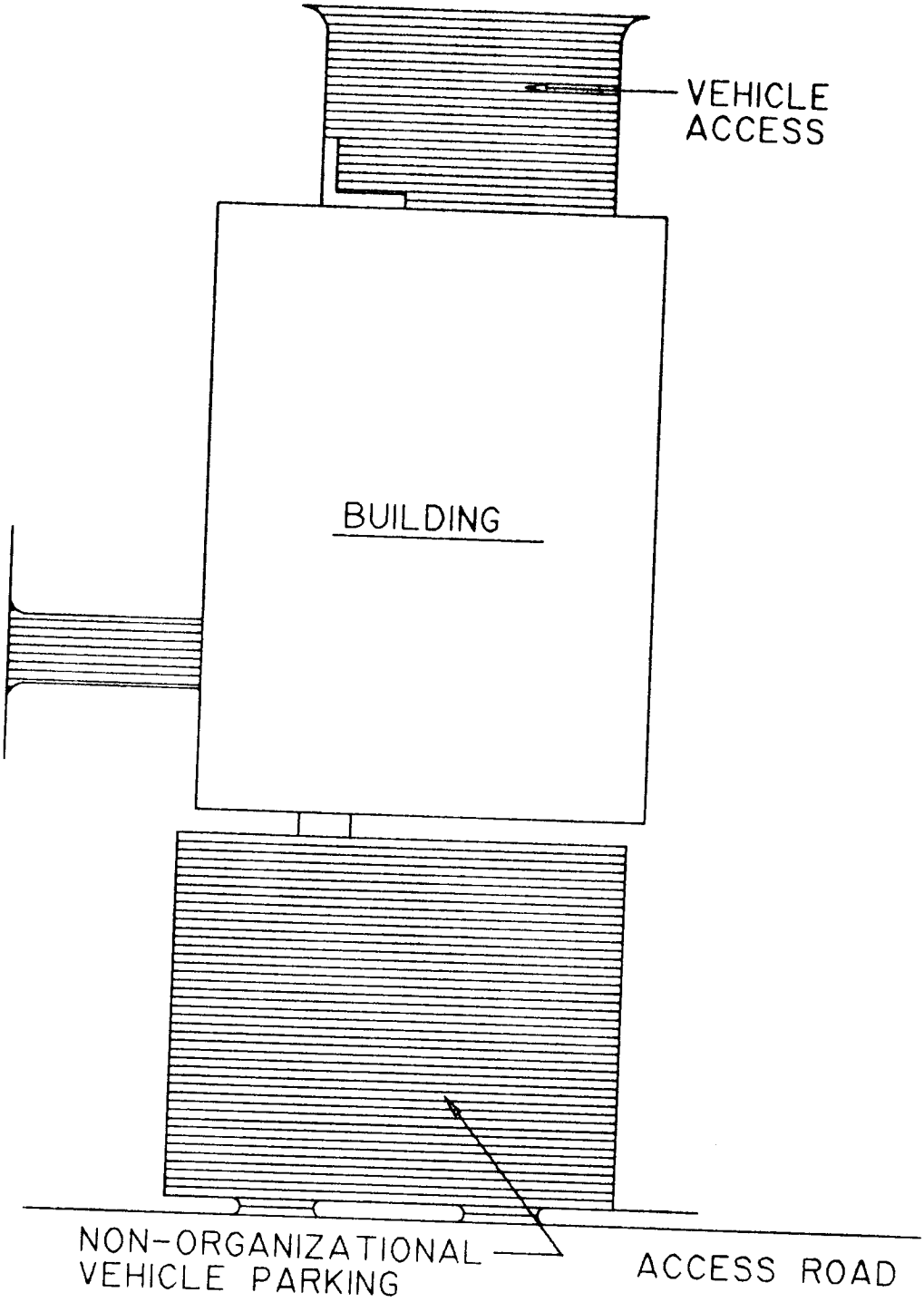
GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM	18,000 S.F.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VF	03/91	211-45	4 OF 4



FLOOR PLAN
NOT TO SCALE

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VW	03/91	211-45	1 OF 3



TYPICAL SITE PLAN

NOT TO SCALE

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VW	03/91	211-45	2 OF 3

NOTES

PLUMBING REQUIREMENTS

WATER	
COLD	83 G.P.M.
HOT	
RECOVERY RATE (100°RISE)	85 G.P.H.
STORAGE	85 G.P.H.

FIRE PROTECTION REQUIREMENTS NOT INCLUDED

HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE

-5°F	+5°F	+15°F	+25°F
329	282	235	188

AIR CONDITIONING REQUIREMENTS

BASED ON 91°F D.B. 76°F WB OUTSIDE DESIGN CONDITIONS

COOLING LOAD (MBH)	330

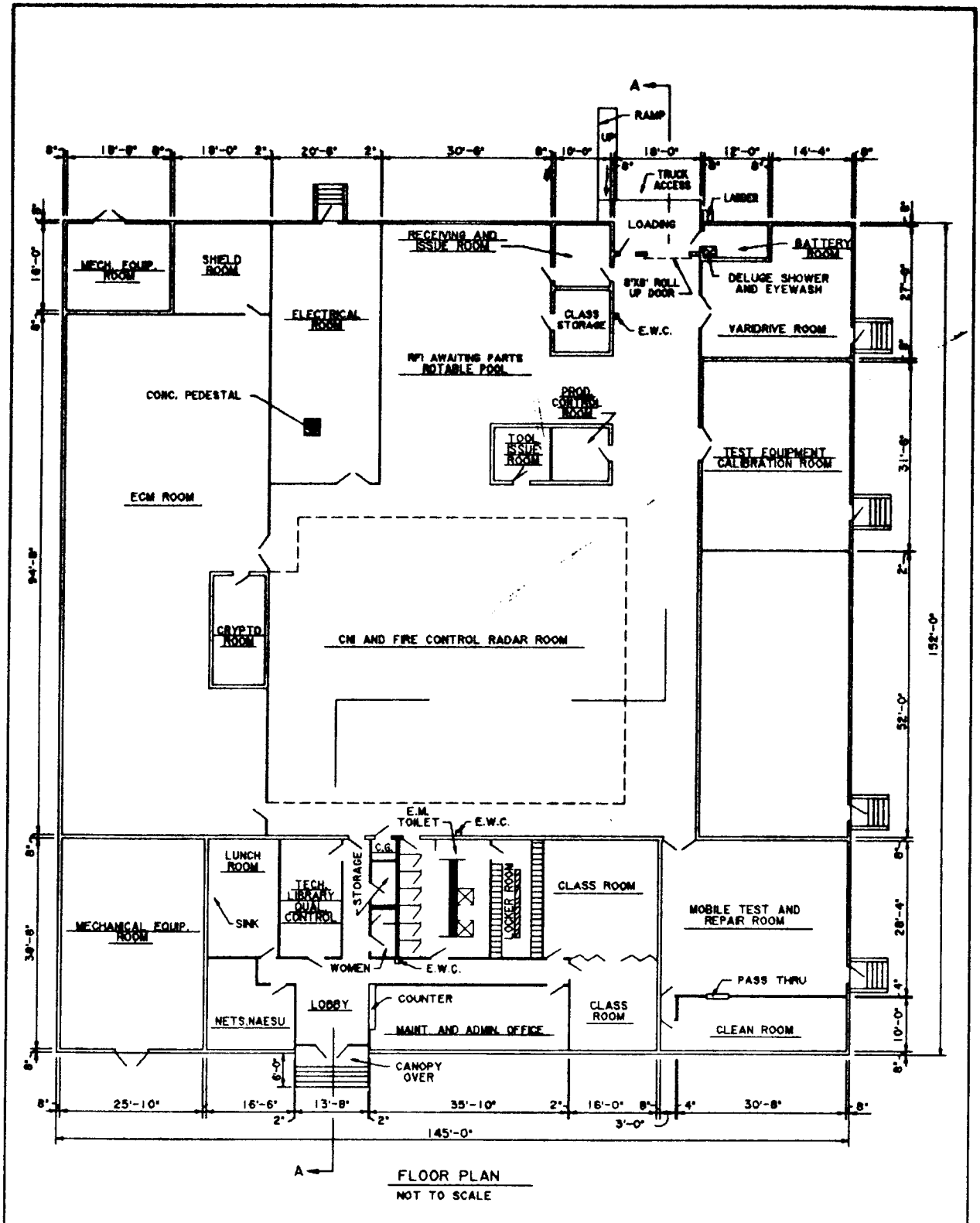
HEAT REJECTED TO CONDITIONED SPACES BY ENERGIZED TEST

EQUIPMENT AND PARTS UNDER REPAIR NOT INCLUDED

ELECTRICAL REQUIREMENTS (KW)

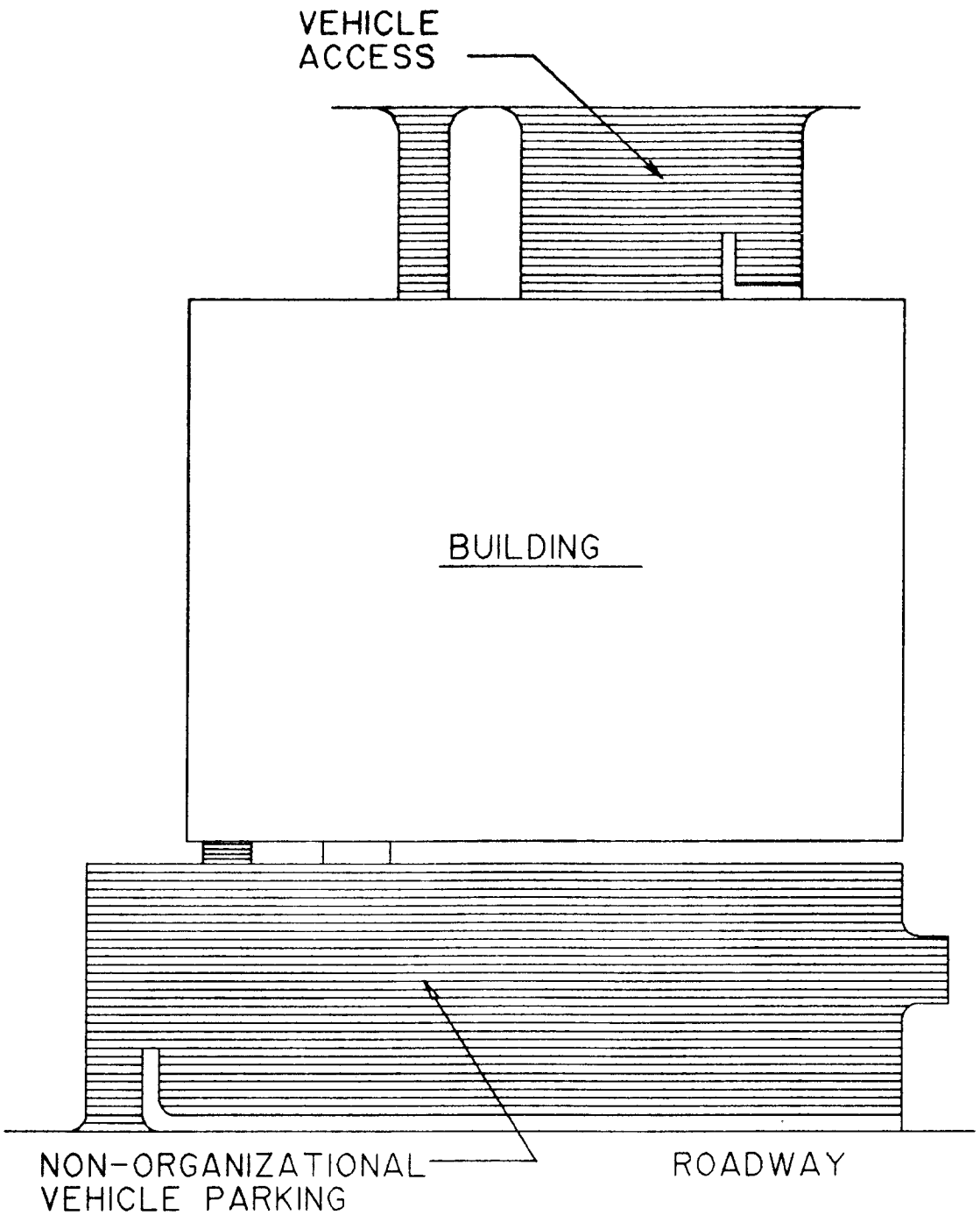
LIGHTS	
CONNECTED LOAD	64.0
ESTIMATED DEMAND	80.0
POWER	
CONNECTED LOAD	460.0
ESTIMATED DEMAND	276.0
TOTAL	
CONNECTED LOAD	524.0
ESTIMATED DEMAND	336.0
AIR CONDITIONING	35.8
AREAS	
GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM	20,000 S.F.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VW	03/91	211-45	3 OF 3



FLOOR PLAN
NOT TO SCALE

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VA	03/91	211-45	1 OF 3



TYPICAL SITE PLAN

NOT TO SCALE

TITLE: AVIONICS SHOP VA	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 2 OF 3

NOTES

PLUMBING REQUIREMENTS

WATER

COLD	76 G.P.M.
HOT	
RECOVERY RATE (100°RISE)	75 G.P.H.
STORAGE	75 G.P.H.

FIRE PROTECTION REQUIREMENTS NOT INCLUDED

HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE

-5°F	+5°F	+15°F	+25°F
362	311	259	207

AIR CONDITIONING REQUIREMENTS

BASED ON 91°F D.B. 76°F WB OUTSIDE DESIGN CONDITIONS

COOLING LOAD (MBH)	363

HEAT REJECTED TO CONDITIONED SPACES BY ENERGIZED TEST

EQUIPMENT AND PARTS UNDER REPAIR NOT INCLUDED

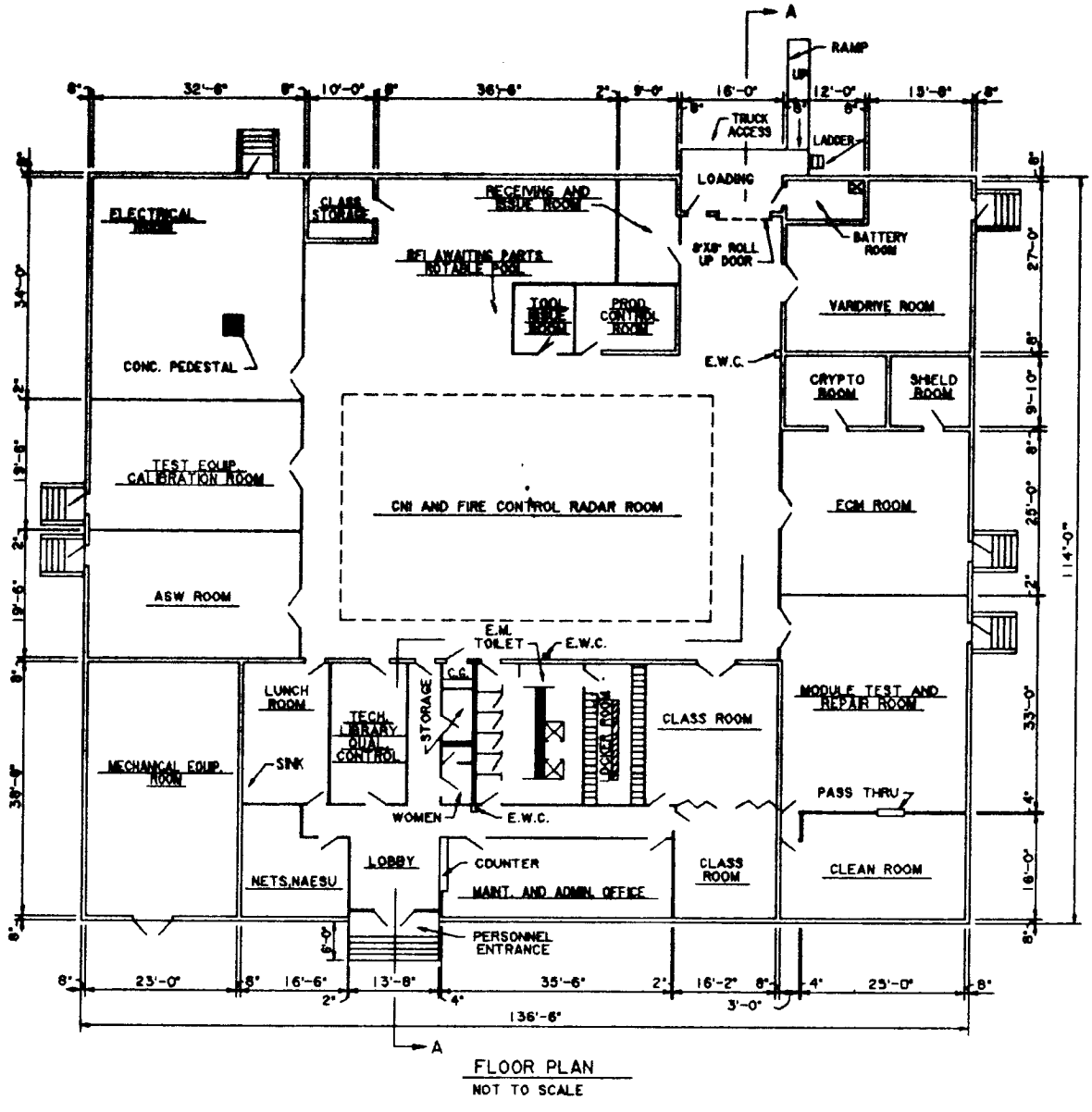
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	70.4
ESTIMATED DEMAND	66.0
POWER	
CONNECTED LOAD	506.0
ESTIMATED DEMAND	303.6
TOTAL	
CONNECTED LOAD	576.4
ESTIMATED DEMAND	369.6
AIR CONDITIONING	39.4

AREAS

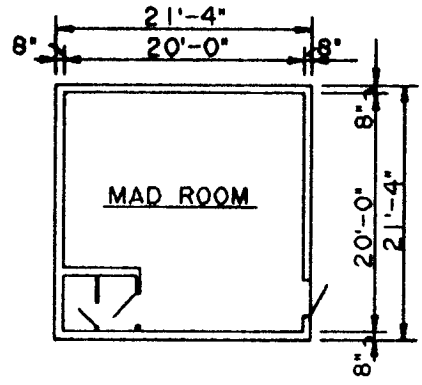
GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM	22,000 S.F.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VA	03/91	211-45	3 OF 3

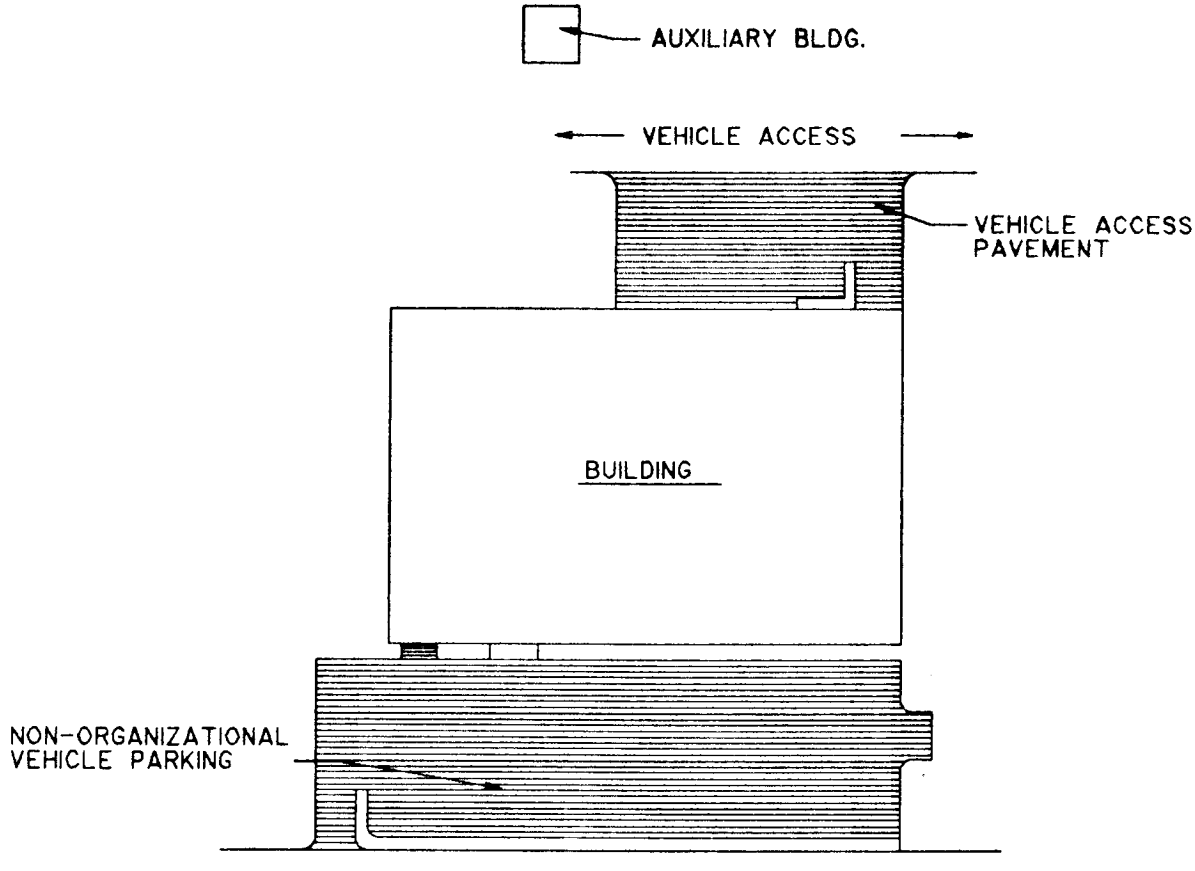


FLOOR PLAN
NOT TO SCALE

TITLE: AVIONICS SHOP VP/VS/VR	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 1 OF 3



AUXILIARY BUILDING
SCALE: 3/32"=1'-0"



TYPICAL SITE PLAN
NOT TO SCALE

TITLE: AVIONICS SHOP VP/VS/VR	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 2 OF 3

NOTES

PLUMBING REQUIREMENTS

WATER

COLD	76 G.P.M.
HOT	
RECOVERY RATE (100°RISE)	75 G.P.H.
STORAGE	75 G.P.H.

FIRE PROTECTION REQUIREMENTS NOT INCLUDED

HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE

-5°F	+5°F	+15°F	+25°F
257	221	184	147

AIR CONDITIONING REQUIREMENTS

BASED ON 91°F D.B. 76°F WB OUTSIDE DESIGN CONDITIONS

COOLING LOAD (MBH) 258

HEAT REJECTED TO CONDITIONED SPACES BY ENERGIZED TEST

EQUIPMENT AND PARTS UNDER REPAIR NOT INCLUDED

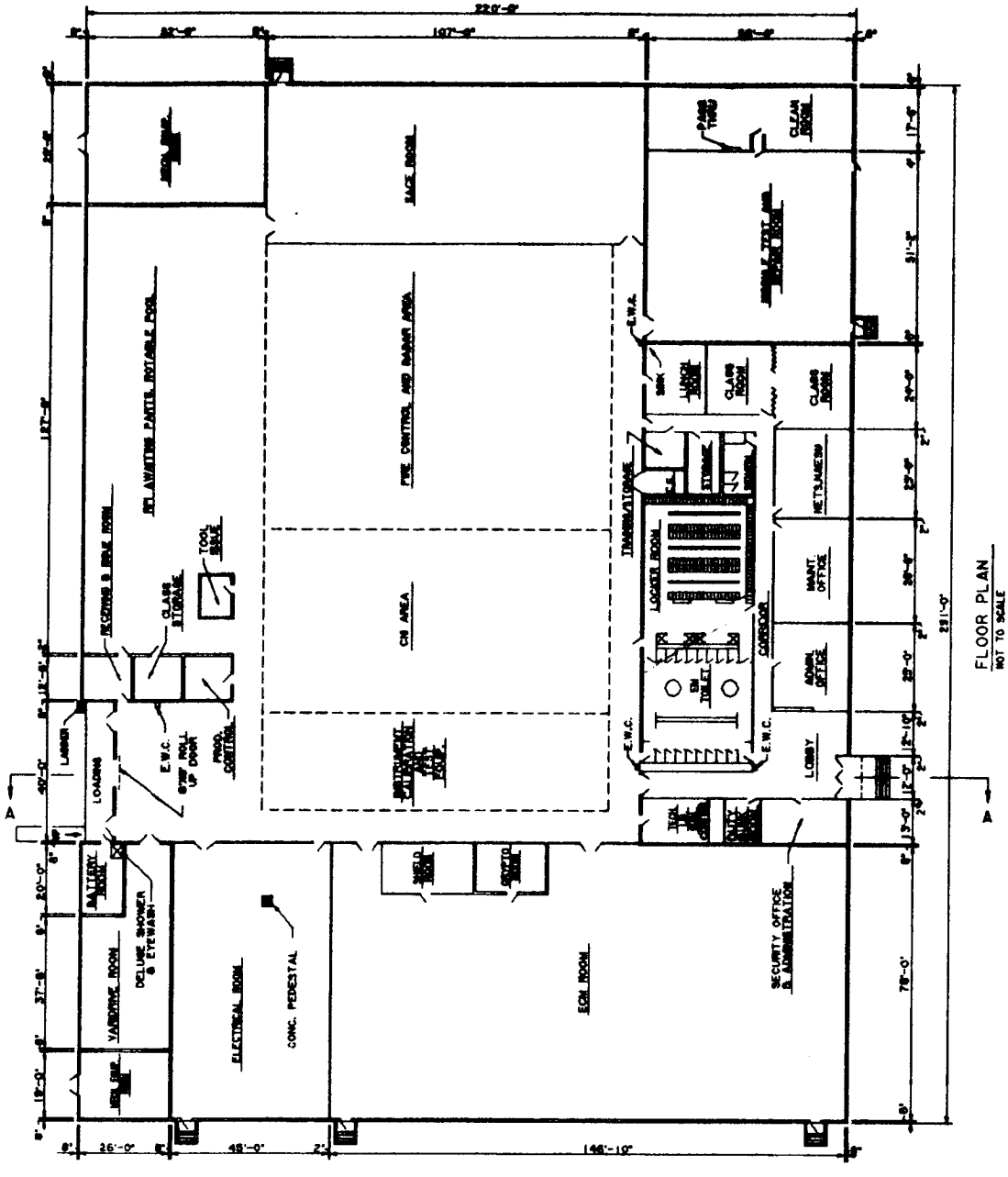
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	49.9
ESTIMATED DEMAND	46.8
POWER	
CONNECTED LOAD	358.8
ESTIMATED DEMAND	215.3
TOTAL	
CONNECTED LOAD	406.7
ESTIMATED DEMAND	262.1
AIR CONDITIONING	27.9

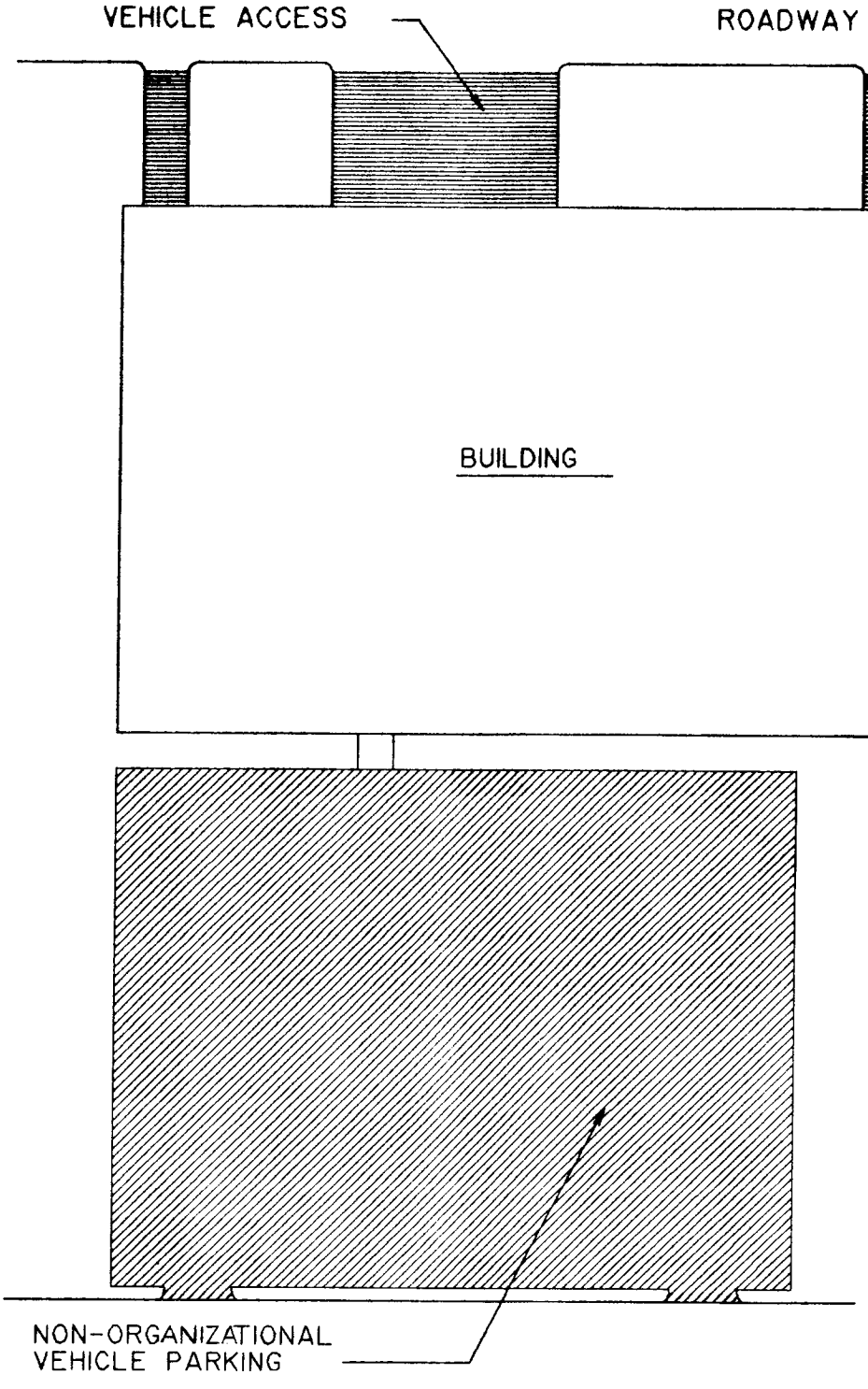
AREAS

GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM	15,600 S.F.
AUXILIARY BUILDING	400 S.F.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VP/VS/VR	03/91	211-45	3 OF 3



TITLE: AVIONICS VA	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 1 OF 3



TYPICAL SITE PLAN

NOT TO SCALE

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VA	03/91	211-45	2 OF 3

NOTES

PLUMBING REQUIREMENTS

WATER

COLD	115 G.P.M.
HOT	
RECOVERY RATE (100°RISE)	135 G.P.H.
STORAGE	135 G.P.H.

FIRE PROTECTION REQUIREMENTS NOT INCLUDED

HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE

-5°F	+5°F	+15°F	+25°F
1054	903	753	602

AIR CONDITIONING REQUIREMENTS

BASED ON 91°F D.B. 76°F WB OUTSIDE DESIGN CONDITIONS

COOLING LOAD (MBH) 1056

HEAT REJECTED TO CONDITIONED SPACES BY ENERGIZED TEST

EQUIPMENT AND PARTS UNDER REPAIR NOT INCLUDED

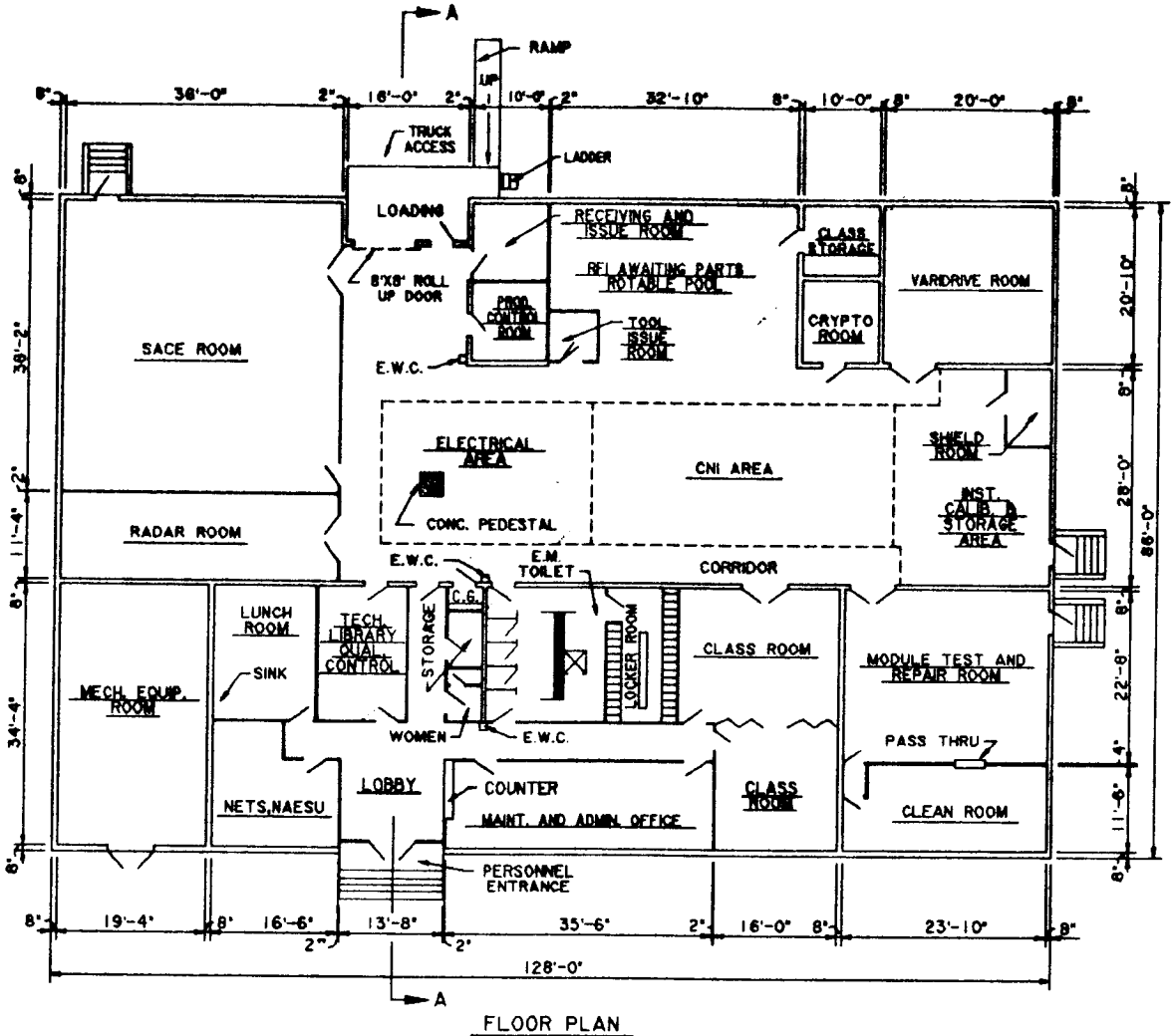
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	204.8
ESTIMATED DEMAND	192.0
POWER	
CONNECTED LOAD	1472.0
ESTIMATED DEMAND	883.2
TOTAL	
CONNECTED LOAD	1676.8
ESTIMATED DEMAND	1075.2
AIR CONDITIONING	114.4

AREAS

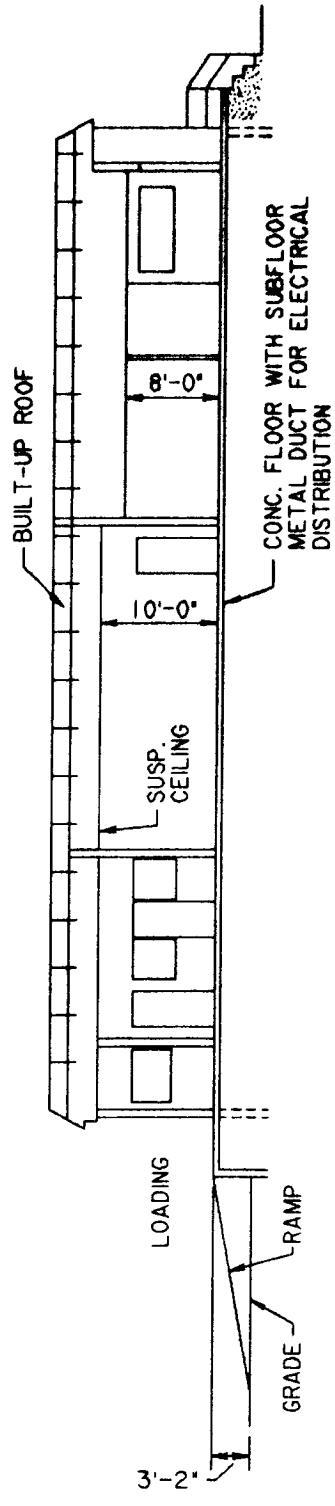
GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM 64,000 S.F.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VA	03/91	211-45	3 OF 3



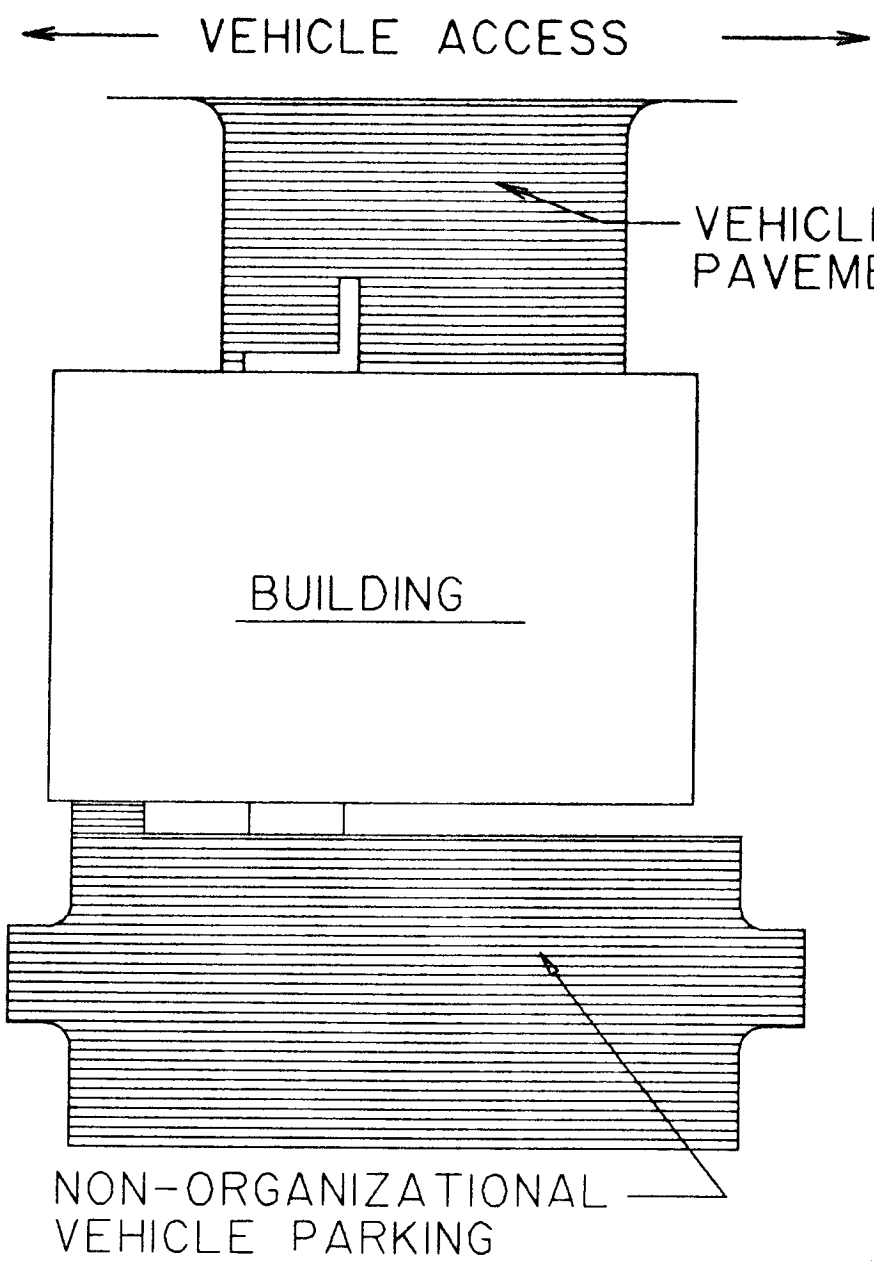
FLOOR PLAN
NOT TO SCALE

TITLE: AVIONICS SHOP VW	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 1 OF 4



SECTION A
NOT TO SCALE

TITLE: AVIONICS SHOP VW	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 2 OF 4



TYPICAL SITE PLAN

NOT TO SCALE

TITLE: AVIONICS SHOP VW	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 3 OF 4

NOTES

PLUMBING REQUIREMENTS

WATER

COLD	68 G.P.M.
HOT	
RECOVERY RATE (100°RISE)	62 G.P.H.
STORAGE	62 GAL.

FIRE PROTECTION REQUIREMENTS NOT INCLUDED

HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE

-5°F	+5°F	+15°F	+25°F
182	156	130	104

AIR CONDITIONING REQUIREMENTS

BASED ON 91°F D.B. 76°F WB OUTSIDE DESIGN CONDITIONS

COOLING LOAD (MBH) 182

HEAT REJECTED TO CONDITIONED SPACES BY ENERGIZED TEST

EQUIPMENT AND PARTS UNDER REPAIR NOT INCLUDED

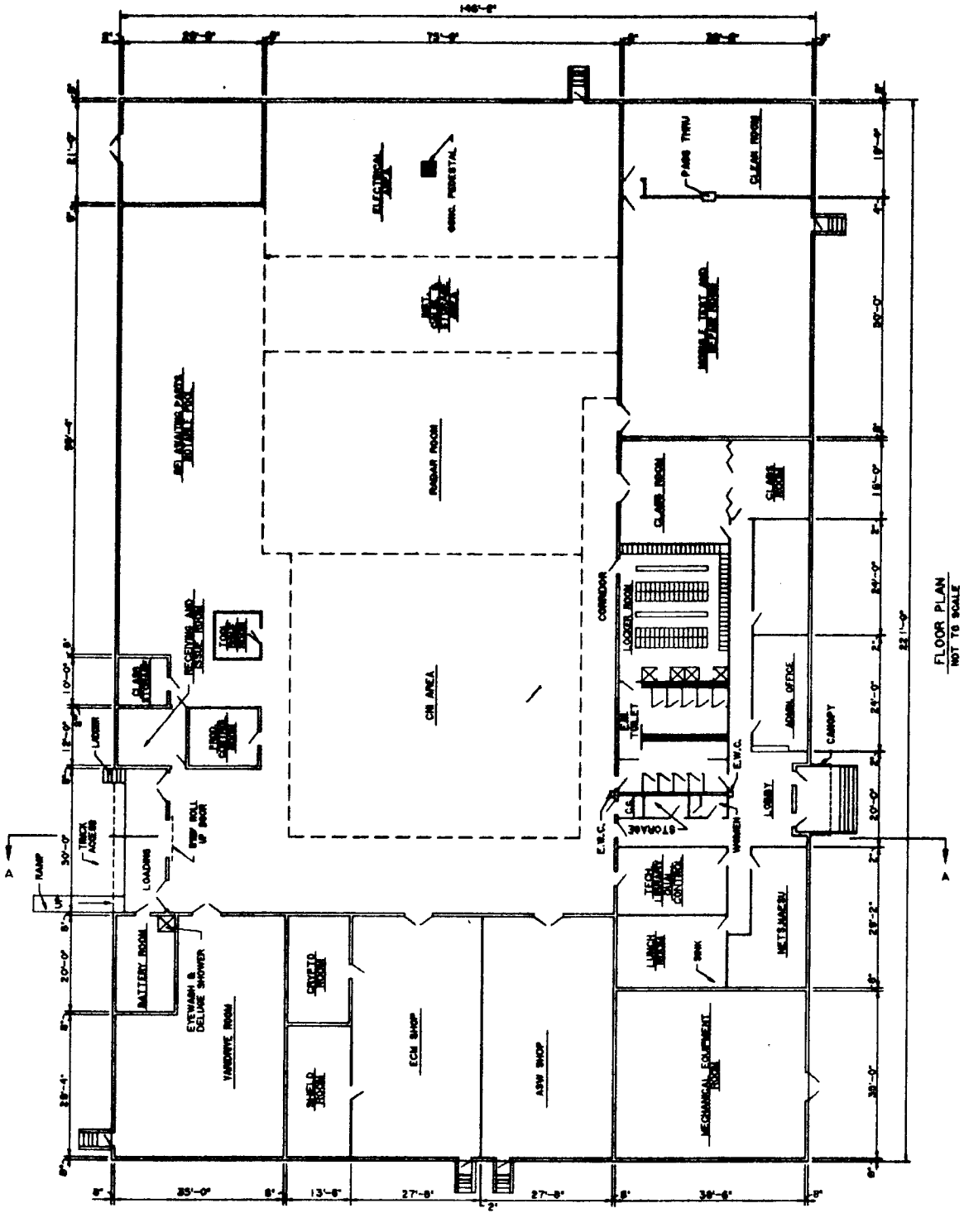
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	35.2
ESTIMATED DEMAND	33.0
POWER	
CONNECTED LOAD	253.0
ESTIMATED DEMAND	151.8
TOTAL	
CONNECTED LOAD	288.2
ESTIMATED DEMAND	184.8
AIR CONDITIONING	19.7

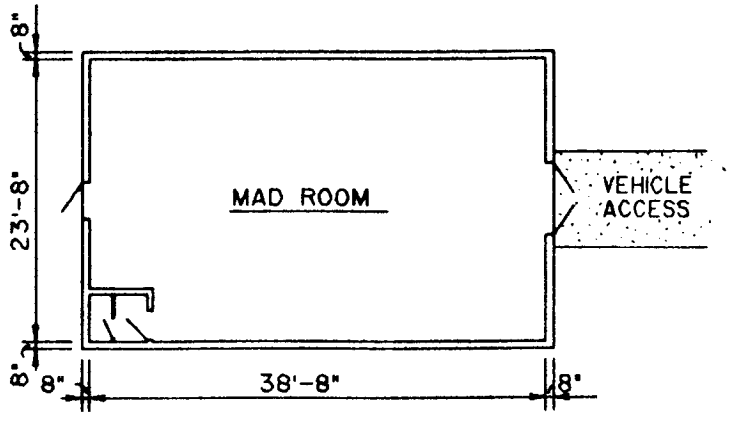
AREAS

GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM 11,000 S.F.

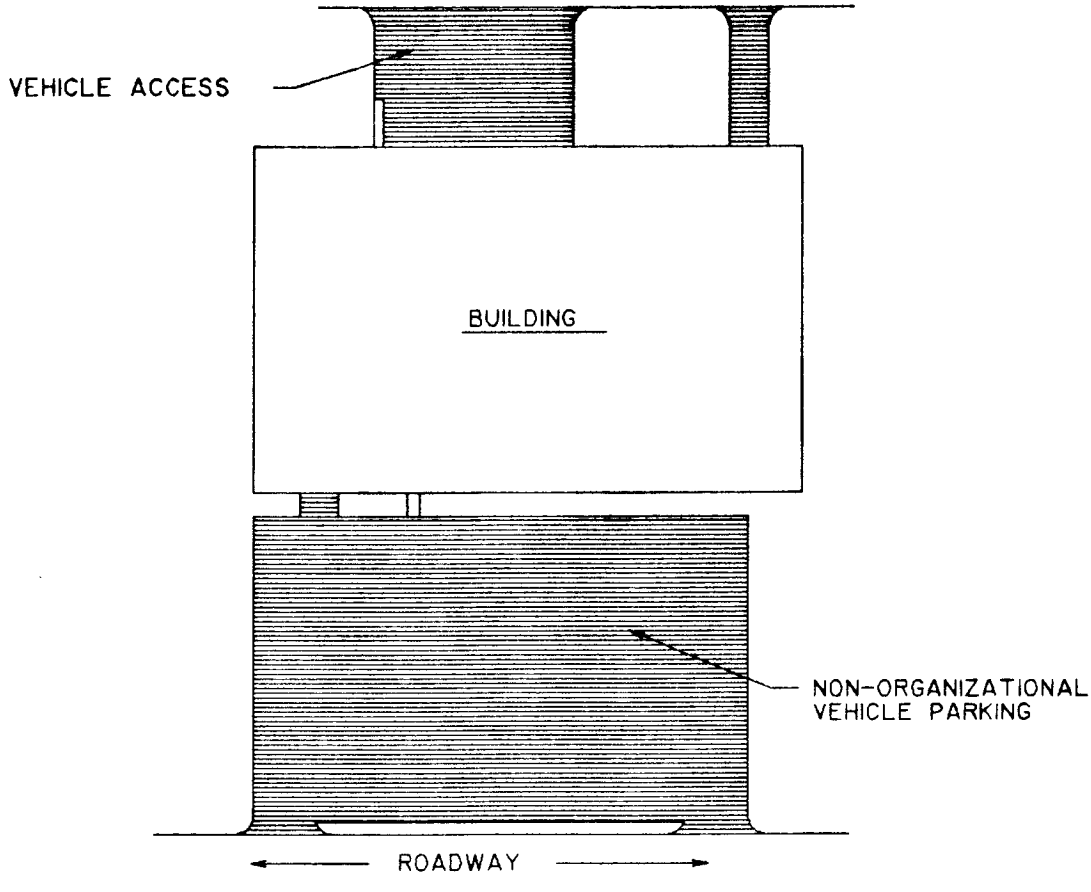
TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VW	03/91	211-45	4 OF 4



TITLE: AVIONICS SHOP VP/VS/VR	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 1 OF 3



AUX. BLDG. FLOOR PLAN



TYPICAL SITE PLAN

NOT TO SCALE

TITLE: AVIONICS SHOP VP/VS/VR	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 2 OF 3

NOTES

PLUMBING REQUIREMENTS

WATER

COLD	100 G.P.M.
HOT	
RECOVERY RATE (100°RISE)	132 G.P.H.
STORAGE	132 GAL.

FIRE PROTECTION REQUIREMENTS NOT INCLUDED

HEATING REQUIREMENTS (MBH)

OUTSIDE DESIGN TEMPERATURE

-5°F	+5°F	+15°F	+25°F
550	471	393	314

AIR CONDITIONING REQUIREMENTS

BASED ON 91°F D.B. 76°F WB OUTSIDE DESIGN CONDITIONS

COOLING LOAD (MBH) 551

HEAT REJECTED TO CONDITIONED SPACES BY ENERGIZED TEST

EQUIPMENT AND PARTS UNDER REPAIR NOT INCLUDED

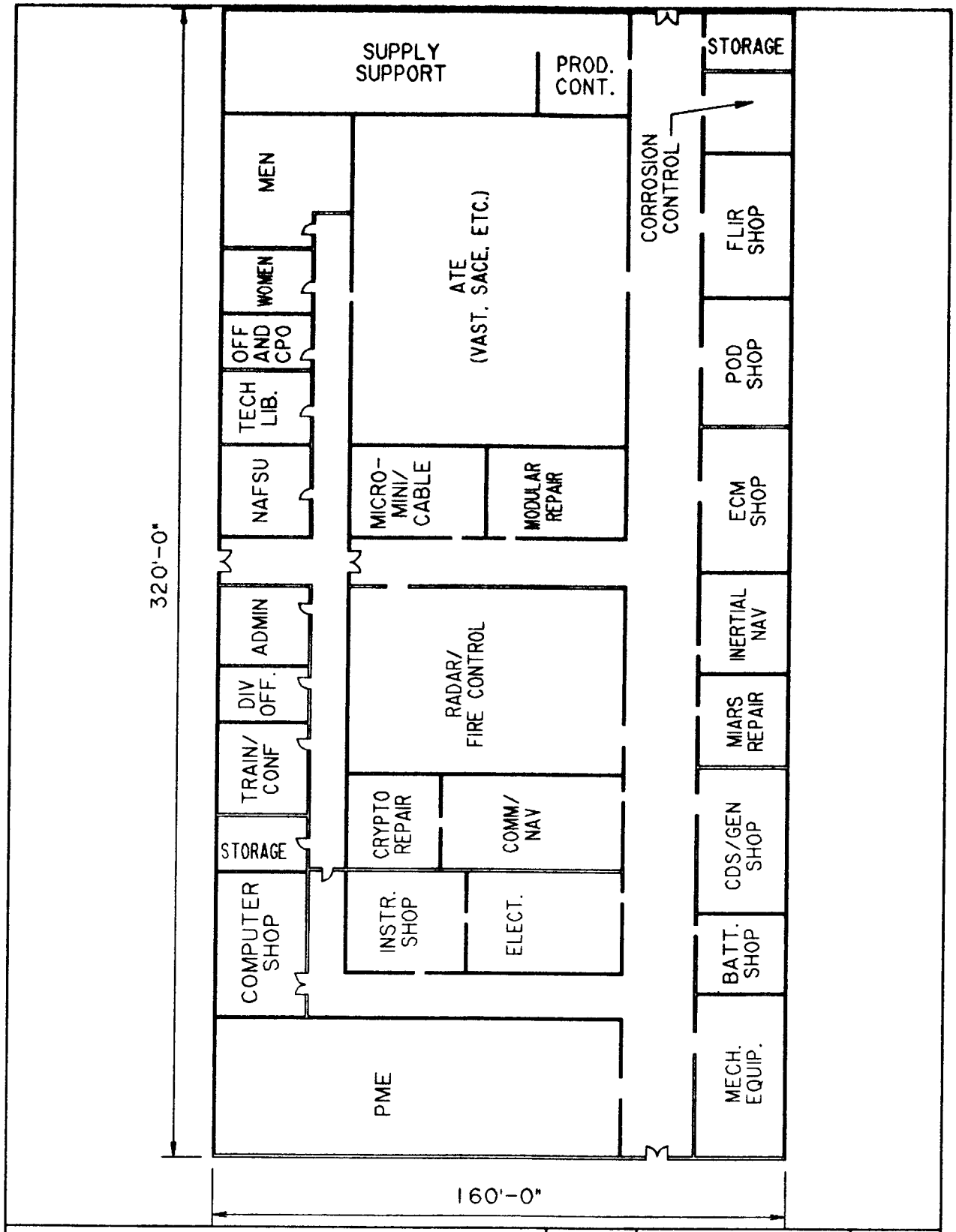
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	103.4
ESTIMATED DEMAND	96.9
POWER	
CONNECTED LOAD	742.9
ESTIMATED DEMAND	445.7
TOTAL	
CONNECTED LOAD	846.3
ESTIMATED DEMAND	542.6
AIR CONDITIONING	59.7

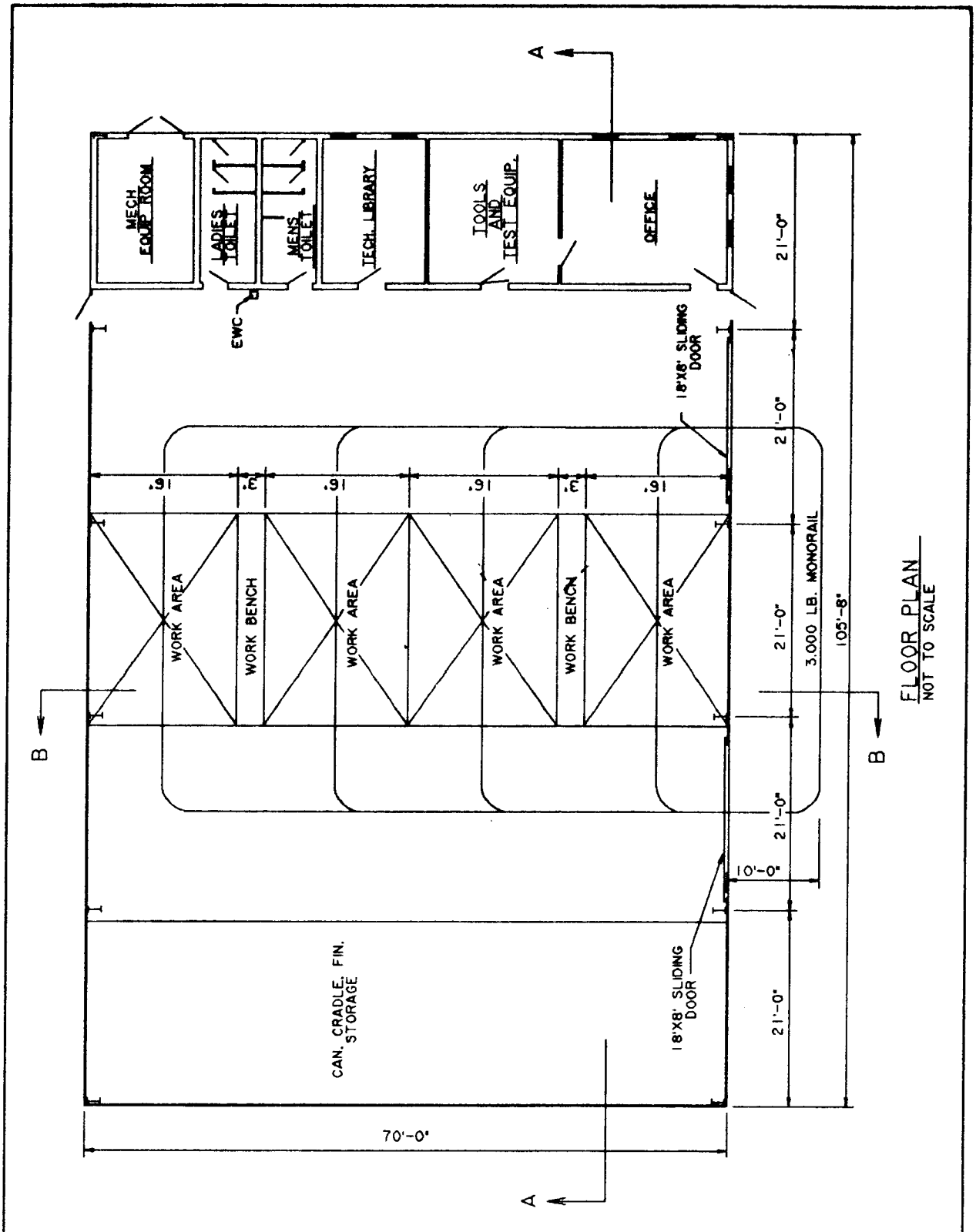
AREAS

GROSS AREA INCLUDING MECHANICAL EQUIPMENT ROOM	32,300 S.F.
AIR CONDITIONING	1,080 S.F.

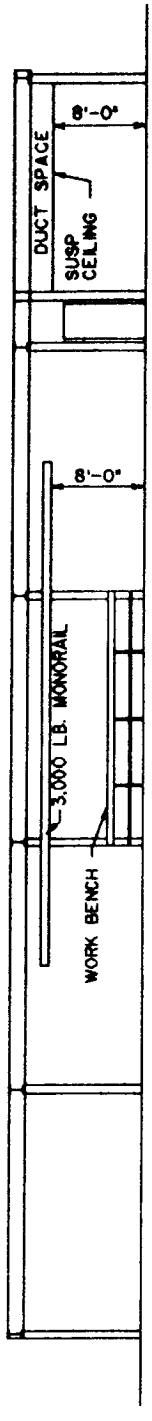
TITLE:	DATE	FACILITY PLATE NO.	SHEET
AVIONICS SHOP VP/VS/VR	03/91	211-45	3 OF 3



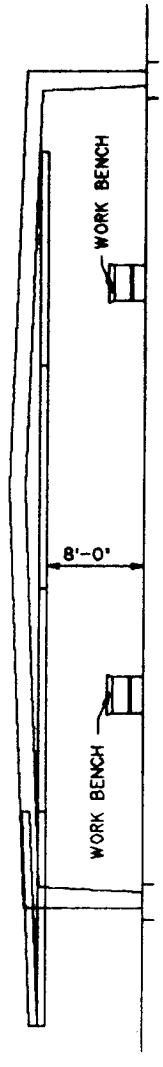
TITLE: AVIONICS SHOP	DATE 03/91	FACILITY PLATE NO. 211-45	SHEET 1 OF 1



TITLE: AIR LAUNCHED GUIDED MISSILE SHOP	DATE 03/91	FACILITY PLATE NO. 212-30	SHEET 1 OF 4

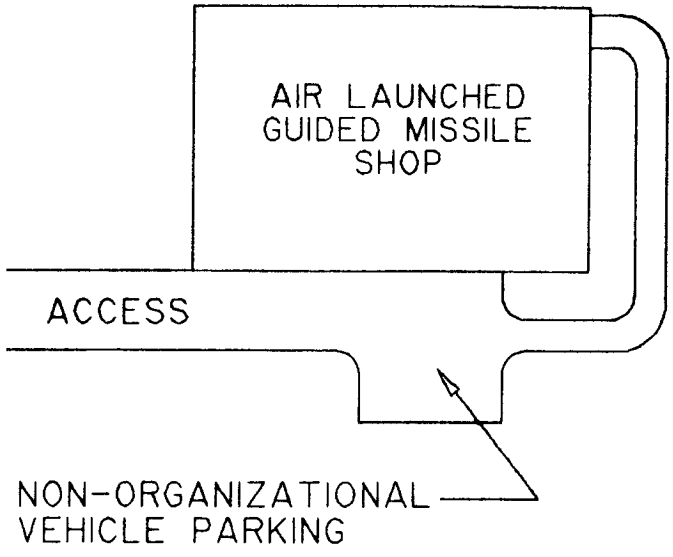


SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

TITLE: AIR LAUNCHED GUIDED MISSILE SHOP	DATE 03/91	FACILITY PLATE NO. 212-30	SHEET 2 OF 4



TYPICAL SITE PLAN

NOT TO SCALE

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AIR LAUNCHED GUIDED MISSILE SHOP	03/91	212-30	3 OF 4

NOTES

PLUMBING REQUIREMENTS

COLD WATER	50 G.P.M.
HOT WATER	
RECOVERY RATE	
(100° F RISE)	30 G.P.H.
STORAGE	40 GAL.

THE ABOVE RATES DO NOT INCLUDE REQUIREMENTS FOR FIRE PROTECTION

HEATING REQUIREMENTS (MBTU/HR)

OUTSIDE DESIGN TEMPERATURE

-5°F	+5°F	+15°F	+25°F
210	190	162	132

AIR CONDITIONING REQUIREMENTS

COOLING LOAD (MBTU/HR)	40.6

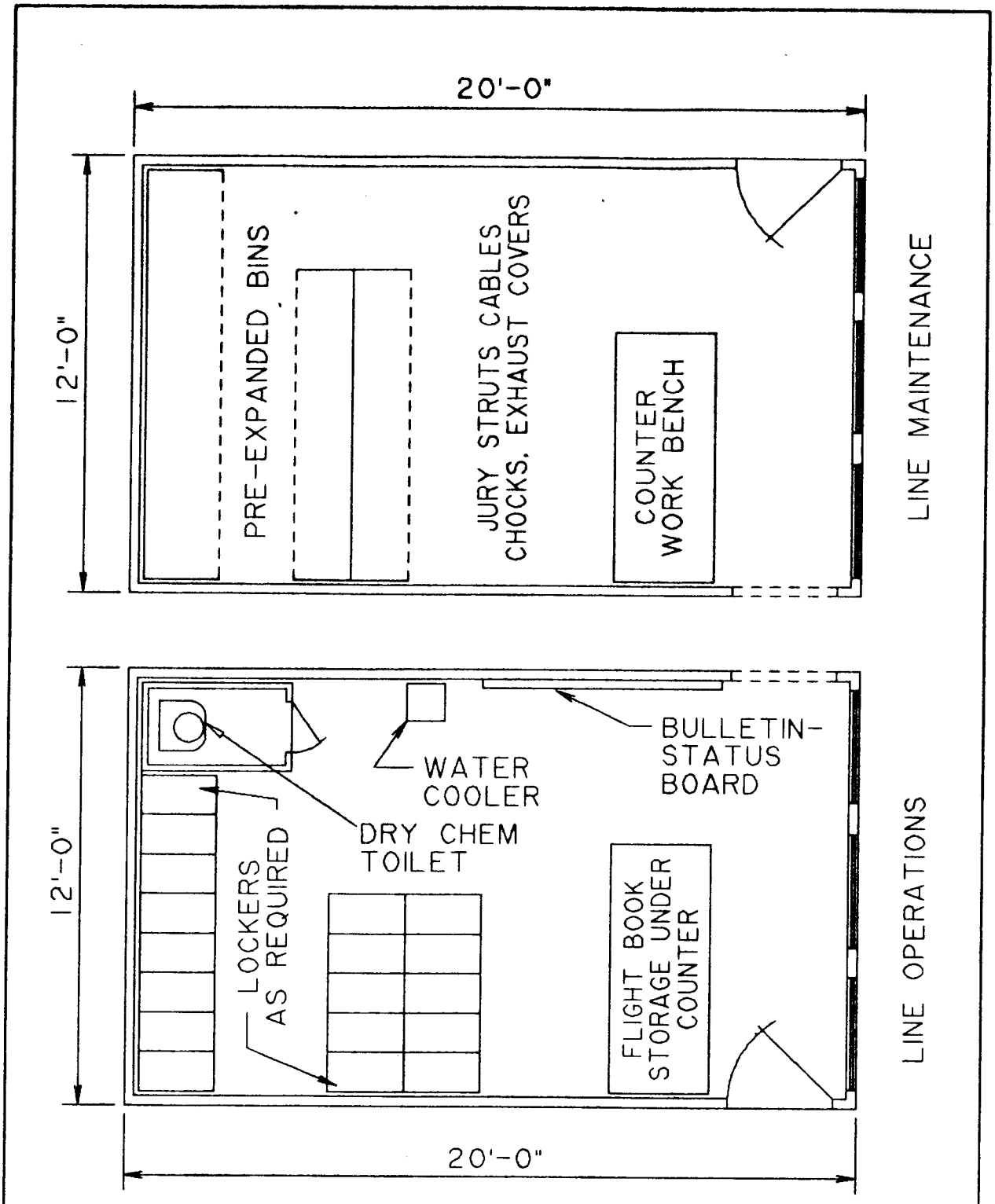
ELECTRICAL REQUIREMENTS (KW)

LIGHTS	
CONNECTED LOAD	35.1
ESTIMATED DEMAND	28.6
POWER	
CONNECTED LOAD	22.2
ESTIMATED DEMAND	19.2
TOTAL	
CONNECTED LOAD	57.3
ESTIMATED DEMAND	47.8
ADDITIONAL DEMAND FOR AIR CONDITIONING	5.9

AREA - SQ. FT. BUILDING

GROSS BUILDING AREA	7,397 S.F.

TITLE:	DATE	FACILITY PLATE NO.	SHEET
AIR LAUNCHED GUIDED MISSILE SHOP	03/91	212-30	4 OF 4



TITLE: PORTABLE LINE SHELTER	DATE 03/91	FACILITY PLATE NO. 211-15	SHEET 1 OF 1

REFERENCES

NOTE: THE FOLLOWING REFERENCED DOCUMENTS FORM A PART OF THIS HANDBOOK TO THE EXTENT SPECIFIED HEREIN. USERS OF THIS HANDBOOK SHOULD REFER TO THE LATEST REVISIONS OF CITED DOCUMENTS UNLESS OTHERWISE DIRECTED.

FEDERAL/MILITARY SPECIFICATIONS, STANDARDS, BULLETINS, HANDBOOKS, NAVFAC GUIDE SPECIFICATIONS, DESIGN MANUALS, AND P-PUBLICATIONS:

Unless otherwise indicated, copies are available from the Defense Printing Service Detachment Office (DPSDO), Standardization Document Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

SPECIFICATIONS

MIL-C-22992	Connector, Plugs and Receptacles, Electrical, Waterproof, Quick Disconnect, Heavy Duty Type.

STANDARDS

MIL-STD-704	Aircraft Electric Power Characteristics.
MIL-STD-1399	Interface Standards for Shipboard Systems, Electric Power, Alternating Current.

HANDBOOKS

MIL-HDBK-1000/1	Engineering and Design Criteria and Documentation for Navy Facilities.
MIL-HDBK-1001/1	Basic Architectural Requirements and Design Considerations.
MIL-HDBK-1001/2	Materials and Building Components.
MIL-HDBK-1002/2	Loads.
MIL-HDBK-1003/3	Heating, Ventilating, Air Conditioning, Dehumidifying System.
MIL-HDBK-1003/17	Industrial Ventilation Systems.
MIL-HDBK-1004/1	Preliminary Design Considerations.
MIL-HDBK-1004/4	Electrical Utilization Systems.
MIL-HDBK-1005/8	Domestic Wastewater Control.

MIL-HDBK-1005/9	Industrial and Oily Wastewater Control.
MIL-HDBK-1008B	Fire Protection for Facilities Engineering, Design, and Construction.
MIL-HDBK-1013/1	Design Guidelines for Physical Security of Facilities.
MIL-HDBK-1013/11	Instruction for High Security Magazine Door Construction.
MIL-HDBK-1021/2	General Concepts for Airfield Pavement Design.
MIL-HDBK-1021/4	Rigid Pavement Design for Airfields.
MIL-HDBK-1023/1	Airfield Lighting.
MIL-HDBK-1028/5	Environmental Control - Design of Clean Rooms.
MIL-HDBK-1028/6	Aircraft Fixed Point Utility Systems.
MIL-HDBK-1190	Facility Planning and Design Guide.
MIL-HDBK-1195	Radio Frequency Shielded Enclosures.

GUIDE SPECIFICATIONS

NFGS-07410	Metal Roof and Wall Panels.
NFGS-08342	Steel Sliding Hangar Doors.
NFGS-13093	Radio Frequency Shielded Enclosures, Demountable Type.
NFGS-13094	Radio Frequency Shielded Enclosures, Welded Type.
NFGS-14535	Monorails With Air Motor Powered Hoist.
NFGS-14637	Cranes, Overhead Electric, Underrunning, (Under 50,000 Pounds).
NFGS-16268	400-Hertz (Hz) Solid State Frequency Converter.
NFGS-16280	Radio Frequency Interference Power Line Filters.

DESIGN MANUALS

DM-1.03	Architectural Acoustics.
DM-3.01	Plumbing Systems.
DM-3.05	Compressed Air and Vacuum Systems.
DM-3.10	Noise and Vibration Control of Mechanical Equipment.
DM-5.04	Pavements.
DM-5.12	Fencing, Gates, and Guard Towers.
DM-22	Petroleum Fuel Facilities.
DM-28.04	General Maintenance Facilities.
DM-38.01	Weight-Handling Equipment.

P-PUBLICATIONS

P-80	Facility Planning Criteria for Navy and Marine Corps Shore Installations.
P-272, Part 3	Definitive Designs for Marine Corps Facilities.

GOVERNMENT INSTRUCTIONS:

NAVFAC 11010.44	Shore Facilities Planning Manual.
NAVSUP 4570.23	Navy Precious Metals Program (PMP).
OPNAV 4790.2	The Naval Aviation Maintenance Program (NAMP).
OPNAV 5510.1	Department of the Navy Information and Personnel Security Program Regulation.
OPNAV 5530.14	Department of the Navy Physical Security and Loss Prevention.

OTHER GOVERNMENT DOCUMENTS AND PUBLICATIONS:

AIR FORCE REGULATIONS

AFR-88-15	Criteria and Standards for Air Force Construction.

NAVAL AIR (NAVAIR) SYSTEMS COMMAND TECHNICAL MANUALS

01-1A-22	Organizational, Intermediate, and Depot Maintenance, Aircraft Radomes, and Antenna Covers.
01-1A-509	Aircraft Weapons Systems Cleaning and Corrosion Control.
01-1A-512	Design Guide for Avionics Shop Power Distribution.
13-1-6.2	Manual Aviation - Crew Systems Parachutes.
16-1-529	Electromagnetic Radiation Hazards (Hazards to Personnel, Fuel, and Other Flammable Material).

NAVAL SEA (NAVSEA) SYSTEMS COMMAND MANUALS

OP-5	Ammunition and Explosives Ashore.

(Unless otherwise indicated, copies are available from the Defense Printing Service Detachment Office (DPSDO), Standardization Document Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

Public Law 29 Code of Federal Regulations, Section 1910, Occupational Safety and Health Administration (OSHA)

(Unless otherwise indicated, copies are available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

NON-GOVERNMENT PUBLICATIONS:

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

Industrial Ventilation, a Manual of Recommended Practice.

(Unless otherwise indicated, copies are available from American Conference of Governmental Industrial Hygienists (ACGIH), Committee of Industrial Ventilation, Building D-5, 6500 Glenway, Cincinnati, OH 45211.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z358.1	Emergency Eyewash and Shower Equipment.

(Unless otherwise indicated, copies are available from American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 523	Specular Gloss.

(Unless otherwise indicated, copies are available from American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 52.1	Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter.

(Unless otherwise indicated, copies are available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), 1791 Tullie Circle N.E., Atlanta, GA 30329-2305.)

FACTORY MUTUAL ENGINEERING CORPORATION (FM)

Approval Guide

(Unless otherwise indicated, copies are available from Factory Mutual Engineering Corporation (FM), 1151 Boston-Providence Turnpike, P. O. Box 688, Norwood, MA 02062.)

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)

Lighting Handbook.

(Unless otherwise indicated, copies are available from Illuminating Engineering Society of North America (IESNA), 120 Wall Street, 17th Floor, New York, NY 10005.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 30	Flammable and Combustible Liquids Code.
NFPA 33	Spray Application Using Flammable or Combustible Materials.
NFPA 70	National Electrical Code.

NFPA 101 Code for Safety to Life From Fire in Buildings and Structures.

NFPA 409 Aircraft Hangars.

(Unless otherwise indicated, copies are available from National Fire Protection Association (NFPA), One Batterymarch Park, P. O. Box 9101, Quincy, MA 02269-9101.)

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

Lead Exposure and Design Considerations for Indoor Firing Ranges, Thomas L. Anania and Joseph A. Seta.

(Unless otherwise indicated, copies are available from the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, 200 Independence Avenue, S.W., Washington, DC 20201.)

UNDERWRITERS LABORATORIES INC. (UL)

Building Materials Directory.

(Unless otherwise indicated, copies are available from Underwriters Laboratories Inc. (UL), 333 Pfingsten Road, Northbrook, IL 60062.)

GLOSSARY

ACGIH. American Conference of Governmental Industrial Hygienists.

AFFF. Aqueous film-forming foam.

AFR. Air Force regulation.

AIMD. Aircraft intermediate maintenance department.

ANSI. American National Standards Institute.

ASHRAE. American Society of Heating, Refrigerating, and Air-Conditioning Engineers.

ASTM. American Society for Testing and Materials.

ASW. Anti-submarine warfare.

CMU. Concrete masonry unit.

CNI. Communications, navigation, and identification.

DM. Design manual.

ECM. Electronic countermeasure.

EFA. Engineering field activity.

EFD. Engineering field division.

FRD. Facilities requirement document.

GASSC. Group Aviation Supply Support Center.

GFI. Ground fault interrupt.

HVAC. Heating, ventilating, and air conditioning.

IWTF. Industrial waste treatment facility.

MAD. Magnetic anomaly detection.

MF. Mobile facility.

MIL-HDBK. Military handbook.

MMF. Mobile maintenance facility.

NAMP. Naval Aviation Maintenance Program.

NAVAIR. Naval Air Systems Command.

NAVFACENGCOM. Naval Facilities Engineering Command.

NAVOSH. Naval Occupational Safety and Health.

NDI. Nondestructive inspection.

NFESC. Naval Facilities Engineering Service Center.

NFGS. Naval facilities guide specification.

NFPA. National Fire Protection Association.

NWS. Naval weapons station.

O/I. Organizational and intermediate.

PMB. Plastic media blasting.

PMP. Precious Metals Program.

PNC. Preferred noise criteria.

RFI. Ready for issue.

SACE. Semiautomatic checkout equipment.

UL. Underwriters Laboratories Inc.

VOC. Volatile organic compound.

CUSTODIAN
NAVY - YD2

PREPARING ACTIVITY
NAVY - YD2

PROJECT NO.
FACR-1157

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-HDBK-1028/1B	2. DOCUMENT DATE *(YYMMDD)* *970115*

3. DOCUMENT TITLE AIRCRAFT MAINTENANCE FACILITIES

4. NATURE OF CHANGE *(identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) DSN *(If applicable)*	7. DATE SUBMITTED: *(YYMMDD)*

8. PREPARING ACTIVITY

a. NAME COMMANDER NAVAL FACILITIES ENGINEERING COMMAND	b. TELEPHONE (*Include Area Code)* (1) Commercial (2) DSN (757) 322-4204 262-4204
c. ADDRESS *(Include Zip Code)* *ATTN: CODE 15C (VRD)* *1510 GILBERT STREET*	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466

NORFOLK, VA 23511-2699	Telephone (703) 756-2340 DSN 289-2340

DD Form 1426, OCT 89 *Previous editions are obsolete.*